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# Chief Editor's Desk

Welcome to Journal of Borneo-Kalimantan, Vol. 1, 2026.

Our first issue of the year featured eight full length articles, two research notes and a book review. The works expressed the Borneo experience of issues that have global significance.

The assertion of culture and values in contemporary Borneo continues to be a topic of interest among researchers in the social science who seek to understand the adaptation of culture in the face of change and transformation. From Muhammad Kurniawan, we learnt the integration of cultural context in the teaching of Bahasa Indonesia for Foreign Speakers in West Kalimantan is an explicit method in the inculcation of the Indonesian value-system among the foreign learners. Another article from West Kalimantan by Muhammad Syaifulloh described the ways in which the Dayak Bemoyo customs adapted to the changes in the community life as they transitioned from the traditional living space to a modern, administrative set-up. Instead of the purging of tradition, it has been a creative adaptation which both maintained and altered the customary practice. Another cultural invention that has stood the test of time is *entelah*, an Iban riddle that articulates the verbal arts of hints and imagery. The authors Feona Albert et al. examined the linguistic composition of the 338 riddles found in the collection of the Tun Jugah Foundation. Culture is also a major focus in the latest edition of Svava magazine, which features a line-up of writings on Borneo. The reviewer drew attention to the notion of culture in the collection and questioned its influence in the framing of issues in Borneo.

The state's pursuit of economic and societal transformation through the deployment of digital technology is the latest in the long march of global development agenda. In Sarawak, the government presents digital technology as one of the strategic thrusts and enabler in the Development Strategy 2030 with the ambitions to grow the state's economy to 8% annually and to raise household income to RM15,047. Three of the articles highlight the current progress of the digital-powered development. Ani Hafiffy discovered that the adoption of digital technology in rural tourism in Lundu was met with positive response by the local operators who looked up for the new opportunity to better their socio-economic circumstances. Zahidin Abdul Rahman et al. assessed the component of cybersecurity in the state's digital infrastructure, while Abdul Basit Hussain et al. argued that the slow rate in the technological development of the human capital is a challenge in realising the 2030 target.

Social change is not only a macro, abstract process but is also felt at the personal level. The acceleration of urbanization has, among other factors, led to increased risks to life in urban areas. Similarly, changes occurring in rural settings have also impacted individual lives. An article by Juna Liau revealed the changes experienced by the survivors of the road traffic injuries which included social, emotional and economic. In another article, Wong Yun Teng has used personal stories to reconstruct the changes brought by the migration of the Chinese to the southwestern Sarawak and their interpersonal connections with the rural community.

We hope you find the articles informative and interesting. Do write and let us know your thought about the writings in the volume.

**Chief Editor**

## **Beyond Language: BIPA Teachers' Perception of the Role of The Cultural Content in Teaching Bahasa Indonesia to Foreign Learners in West Kalimantan**

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### **ABSTRACT**

*Culture has become an essential component in the teaching of Bahasa Indonesia for Foreign Speakers (BIPA), as language learning involves not only linguistic competence but also cultural understanding. This study explores the perception of BIPA teachers in West Kalimantan regarding the role of cultural content in teaching Indonesian to foreign learners. Employing a descriptive qualitative approach, data were collected through an online questionnaire distributed to BIPA teachers in West Kalimantan. The questionnaire consisted of demographic questions, perception-based items, and open-ended survey questions. Three BIPA teachers participated in the study. Data were analyzed using thematic analysis to identify recurring themes related to perceptions, classroom practices, challenges, and recommendations. The findings reveal that teachers perceive cultural content as an inseparable aspect of language learning because it provides context for communication and helps learners understand Indonesian social values. Teachers have integrated various forms of local culture, including traditional songs, culinary traditions, local customs, and intercultural discussions. Authentic cultural materials were found to increase learner engagement and facilitate meaningful learning experiences. However, participants also identified challenges, including limited culturally responsive teaching resources, difficulties in explaining culturally specific concepts, and financial constraints that hinder experiential learning activities. The participants recommended developing more culturally diverse BIPA materials and increasing the representation of regional cultures beyond Java. The study contributes to the growing body of literature on culturally responsive BIPA instruction and highlights the importance of integrating local cultural perspectives into language education.*

*Keywords: BIPA; cultural content; intercultural competence; Kalimantan culture; teachers' perception.v*

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## INTRODUCTION

The increasing international interest in learning Bahasa Indonesia has encouraged the development of Bahasa Indonesia bagi *Penutur Asing* (BIPA) programs in various countries. Indonesian is taught not only as a language of communication but also as a gateway to understanding Indonesian society, culture, and identity (Widodo, 2019). As the number of foreign learners continues to grow, BIPA teachers face the challenge of providing learning experiences that support both linguistic competence and intercultural understanding.

Language and culture are closely interconnected. Language functions as a medium through which cultural values, beliefs, traditions, and social norms are expressed (Kramersch, 2013). Therefore, language learning cannot be separated from cultural learning. Learners who understand the cultural context of a language are more likely to communicate effectively and appropriately in real-life situations. Conversely, limited cultural knowledge may result in misunderstandings despite adequate linguistic proficiency (Byram, 2021).

The importance of integrating culture into language teaching has been highlighted in various studies on intercultural communication and foreign language education. Cultural learning enables learners to interpret meanings, understand social expectations, and interact appropriately with members of different communities (Giles, 2016). In BIPA contexts, cultural content helps foreign learners understand Indonesian ways of life while developing practical communication skills (Suyitno, 2017).

Indonesia's cultural diversity provides rich opportunities for integrating local culture into language instruction. However, cultural representation in BIPA teaching materials often remains concentrated on major cultural centers such as Java and Bali (Aini, et.al, 2025). As a result, learners may receive a limited understanding of Indonesia's multicultural reality. Integrating cultural content from regions such as Kalimantan can broaden learners' perspectives and provide a more comprehensive picture of Indonesian society.

Kalimantan possesses unique cultural traditions, local wisdom, indigenous practices, and artistic expressions that can enrich BIPA learning. Traditional ceremonies, folklore, culinary traditions, music, and community practices offer authentic resources for language instruction (Richards, 2022). Through these cultural elements, learners can engage with Indonesian culture in meaningful and contextualized ways.

Teachers play a crucial role in selecting and implementing cultural content (Hadisaputra et al., 2024). Their perceptions provide valuable insights into classroom practices, learner responses, and challenges associated with cultural integration (Anyichie et al., 2023). Despite growing attention to cultural learning in BIPA, limited studies have explored teachers' experiences with local cultural content from Kalimantan.

Therefore, this study aims to investigate the perceptions of BIPA teachers regarding the integration of cultural content in teaching Indonesian to foreign learners.

The study addresses the following research questions:

1. How do BIPA teachers perceive the role of cultural content in teaching Indonesian to foreign learners?
2. How do BIPA teachers integrate local cultural content into their classroom practices?
3. What challenges and recommendations do BIPA teachers identify regarding the integration of cultural content in BIPA instruction?

## LITERATURE REVIEW

### *Language and Culture in Foreign Language Education*

The relationship between language and culture has long been recognized in language education. Kramsch (2013) argues that language is not merely a system of communication but also a carrier of cultural meanings. Learning a language involves understanding how people think, behave, and interact within particular social contexts (Firmansyah & Saepuloh, 2022).

Byram (2021) introduced the concept of intercultural communicative competence, emphasizing that effective communication requires cultural awareness in addition to linguistic skills. Learners need to understand cultural perspectives, values, and practices in order to engage successfully with members of other cultures.

### *Cultural Content in BIPA Learning*

Cultural content serves an important role in BIPA instruction. It provides learners with contextual knowledge that supports meaningful language use. Cultural materials may include folklore, customs, traditions, local wisdom, food, music, arts, and social practices (Hoaihongthong & Tuamsuk, 2024).

Studies have shown that authentic cultural materials increase learner engagement and motivation. Exposure to cultural content also encourages intercultural awareness and helps learners connect language learning with real-world experiences (Jain, 2024).

### *Teacher Perception and Cultural Integration*

Teachers' viewpoints play a significant role in understanding educational practices and classroom realities. Investigating teachers' perspectives provides valuable information about how they interpret, value, and implement particular instructional elements in their teaching (Ravi et al., 2023). Such studies offer insights into educators' experiences, expectations, and concerns, helping researchers identify both the benefits and challenges associated with specific pedagogical

approaches (Alwaqdani, 2024). By examining these perspectives, researchers can gain a more comprehensive understanding of factors that shape teaching effectiveness and learner outcomes.

Teachers' perceptions are particularly valuable for understanding how cultural content is selected and adapted in BIPA classrooms. Such perceptions can inform curriculum development and material design for future BIPA programs.

## METHODOLOGY

### *Research Design*

This study employed a descriptive qualitative research design. The research aimed to explore teachers' perceptions regarding the integration of cultural content into BIPA instruction.

### *Participants*

The study involved three BIPA teachers from West Kalimantan who voluntarily completed an online questionnaire. Participants represented different educational settings and teaching experiences.

To recruit participants, the questionnaire was distributed through a WhatsApp group of the BIPA Teachers Association in West Kalimantan. The invitation was open to all members of the group who were actively involved in teaching Indonesian to foreign learners. Participation was voluntary, and no specific sampling criteria beyond BIPA teaching experience were applied. Although the survey was made available to all eligible members, only three teachers were available during the data collection period and subsequently returned completed questionnaires. Consequently, the study analyzed responses from these three participants.

TABLE 1. *Participant Profile*

<b>Participant</b>	<b>Gender</b>	<b>Teaching Experience</b>
P1	Female	1–3 years
P2	Male	More than 6 years
P3	Female	1–3 years

### *Data Collection*

Data were collected through an online questionnaire consisting of demographic questions and open-ended survey questions. Participants were invited to describe their experiences integrating local cultural content into BIPA instruction.

### *Data Analysis*

The responses were analyzed using thematic analysis. The process involved familiarization with the data, coding, categorization, theme development, and interpretation based on Braun and Clarke (2006).

The researcher first read the responses several times to become familiar with the data. Initial codes were then generated manually from relevant segments of text. These codes were grouped into categories and then refined into themes that addressed the research questions.

To ensure the trustworthiness of the analysis, the coding process and emerging themes were reviewed with a colleague experienced in qualitative research through peer debriefing. The researcher also repeatedly checked the original responses to confirm that the themes accurately represented the participants' views. An audit trail was maintained throughout the analysis process. Three major themes emerged from the analysis, and these themes are presented in the Findings and Discussion section.

## RESEARCH FINDINGS

### *Theme 1: Cultural Content as an Essential Component of Language Learning*

All participants emphasized the importance of cultural content in BIPA learning. They viewed culture as an inseparable aspect of language instruction because language reflects social values and cultural practices.

Participant 2 stated:

*Indonesian: "Konten budaya penting dalam pembelajaran BIPA karena membantu pembelajar memahami konteks penggunaan bahasa dalam kehidupan nyata. Dengan memahami konten budaya, penutur asing dapat berkomunikasi lebih tepat, kontekstual, dan memahami nilai sosial masyarakat Indonesia."*

*Translated: "Cultural content is important in BIPA (Indonesian for Foreign Speakers) learning because it helps learners understand the context in which the language is used in real-life situations. By understanding cultural content, foreign learners can communicate more appropriately and contextually, while also gaining a better understanding of the social values of Indonesian society."*

Similarly, Participant 3 highlighted the practical significance of cultural knowledge:

*Indonesian: "Karena mereka butuh untuk aplikasikan bahasa dan hidup tengah masyarakat Indonesia."*

*English: "Because they need to apply the language and live among Indonesian society."*

Participant 1 emphasized the importance of understanding Indonesian perspectives:

*Indonesian: “Supaya peserta didik bisa melihat sebuah budaya lokal Indonesia dari sudut pandang orang Indonesia (konstruksi mindset).”*

*English: “So that learners can understand and view an Indonesian local culture from the perspective of Indonesians, thereby helping to shape their mindset.”*

These perceptions demonstrate that teachers perceive cultural learning as a means of supporting meaningful communication. These reflections show that language cannot be separated from culture. The teachers' focus on shaping a "mindset" and understanding "social values" directly supports Kramsch's (2013) view of language as a carrier of culture. Furthermore, the need for learners to "live among Indonesian society" highlights the practical importance of Byram's (2021) intercultural communicative competence for real-world interaction.

### ***Theme 2: Integrating Local Culture Through Authentic Learning Experiences***

Participants reported incorporating various cultural elements into classroom activities. The cultural topics included traditional songs, food traditions, local customs, and intercultural discussions.

Participant 1 described a successful learning activity involving Dayak songs:

*Indonesian: “Menyanyikan lagu khas Dayak. Sesi tersebut sangat sukses karena background mahasiswa asing yang saya ajar adalah seni musik.”*

*English: “The students sang a traditional Dayak song. The session was highly successful because the foreign learners I taught had a background in music and the performing arts.”*

The experience suggests that cultural content becomes particularly effective when it aligns with learners' interests. Participant 1 further reflected:

*Indonesian: “Masalah utama bukanlah terletak pada budaya lokal apa yang kita ajarkan, namun apakah bidang budaya tersebut relevan dengan minat peserta didik kita.”*

*English: “The primary concern is not the specific local culture being taught, but rather whether the cultural content is relevant to the interests and needs of the learners.”*

Participant 2 shared an example involving local cuisine:

*Indonesian: “Salah satu pengalaman yang berhasil menarik minat peserta didik asing adalah ketika kami membahas makanan khas Kalimantan, seperti tempoyak dan pekasam.”*

*English: “One experience that successfully engaged foreign learners was a lesson on traditional Kalimantan cuisine, particularly dishes such as tempoyak and pekasam.”*

Students compared Indonesian food traditions with those of their home countries, creating opportunities for intercultural dialogue and vocabulary development.

Participant 3 highlighted learner curiosity regarding marriage traditions in eastern Indonesia:

*Indonesian: "Seorang pria di Sumba harus memberikan 100 sapi untuk mahar wanita dalam menikah."*

*English: "A man in Sumba must provide 100 cattle as a bride price to marry a woman."*

The discussion generated active participation because students found the cultural practice unique and different from their own experiences.

These findings indicate that authentic cultural materials facilitate engagement, discussion, and intercultural comparison. These activities do more than just engage students; they bridge cultural gaps. Using the Dayak song illustrates Kramsch's (2013) idea of language carrying cultural art. Additionally, when students compared Kalimantan's food or Sumba's customs to their own, they were actively practicing the comparative skills central to Byram's (2021) intercultural competence framework.

### ***Theme 3: Challenges and Recommendations for Cultural Integration***

Despite recognizing its importance, participants reported several challenges.

The first challenge involved limited opportunities for experiential learning. Participant 1 explained:

*Indonesian: "Mahasiswa asing lebih paham dengan budaya jika mereka bisa melihat langsung, namun kendala budget membatasi pembelajar tersebut mengalami kegiatan-kegiatan bertemakan budaya lokal."*

*English: Foreign learners develop a deeper understanding of culture when they can experience it firsthand. However, budget limitations often restrict their participation in activities centered on local cultural practices and traditions.*

This finding suggests that direct cultural exposure may be constrained by financial limitations.

The second challenge concerned teaching resources. Participant 2 stated:

*Indonesian: "Kurangnya referensi dan materi pembelajaran yang mengintegrasikan budaya lokal secara relevan dengan konteks BIPA."*

*English: "A lack of references and learning materials that integrate local culture in a way that is relevant to the BIPA context."*

The participant further explained that cultural materials need to be adapted to learners' language proficiency levels.

Participant 3 identified conceptual challenges:

*Indonesian: “Menjelaskan secara saintifik mengenai konsep lokal, mitos, kepercayaan.”*

*English: “Explaining local concepts, myths, and beliefs from a scientific perspective.”*

Certain cultural concepts may require additional explanation because they are deeply rooted in local worldviews and traditions.

Regarding recommendations, participants emphasized the importance of increasing cultural diversity in BIPA materials.

Participant 2 suggested:

*Indonesian: “Perlu lebih banyak pengembangan bahan ajar BIPA yang mengintegrasikan budaya lokal secara kontekstual, sederhana, dan sesuai dengan tingkat kemampuan pemelajar.”*

*English: “There is a need for further development of BIPA instructional materials that integrate local culture in a contextualized, accessible, and proficiency-appropriate manner.”*

The participant also encouraged collaboration with local communities to provide authentic cultural resources.

Participant 3 expressed concern regarding the dominance of Javanese culture in existing materials:

*Indonesian: “Jangan hanya fokus di budaya Jawa seperti yang banyak di buku BIPA.”*

*English: “BIPA materials should not focus exclusively on Javanese culture, as is the case in many existing BIPA textbooks.”*

The findings suggest that future BIPA materials should represent Indonesia’s regional diversity more comprehensively. These challenges highlight critical gaps in current BIPA education. The difficulty in explaining local myths shows how deeply language is tied to specific worldviews, as argued by Kramsch (2013). Ultimately, the overrepresentation of Javanese culture limits learners from developing a complete intercultural communicative competence (Byram, 2021) regarding Indonesia's true regional diversity.

## CONCLUSION

This study explored the perceptions of BIPA teachers in West Kalimantan regarding the role of cultural content in teaching Indonesian to foreign learners. The findings indicate that teachers perceive culture as an essential component of language learning because it provides context, facilitates communication, and supports intercultural understanding.

Participants integrated various cultural elements into classroom activities, including traditional songs, local food, customs, and intercultural discussions. Authentic cultural materials increased learner engagement and encouraged meaningful learning experiences.

However, challenges remain, including limited resources, difficulties explaining cultural concepts, and financial constraints that restrict experiential learning opportunities. Participants recommended developing more culturally diverse BIPA materials and increasing representation of regional cultures beyond Java.

The study contributes to the development of culturally responsive BIPA instruction and highlights the importance of integrating local cultural perspectives into language education. Future research involving larger samples and multiple regions is recommended to obtain broader insights into the role of local culture in BIPA learning.

### **ACKNOWLEDGEMENT**

The author would like to express sincere gratitude to the BIPA teachers who participated in this study and generously shared their experiences and perceptions. Their insights made this research possible.

### **ETHICAL CONSIDERATIONS**

Participation in this study was entirely voluntary. Before completing the questionnaire, participants were informed about the purpose of the research, the nature of their involvement, and the intended use of the collected data. Informed consent was obtained from all participants prior to data collection.

To ensure confidentiality and anonymity, no personal identifiers or institutional affiliations were reported in the study. Participants were assigned pseudonymous codes (P1, P2, and P3) for reporting purposes. Participants were also informed that anonymized excerpts from their responses might be included in research publications and presentations, and they consented to such use. Given the small number of participants, additional care was taken to remove any information that could potentially reveal individual identities or specific workplaces.

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## From Myth to Modernity: Socio-Cultural Resilience and Transformation of the *Bemoyo* Community in Suti Semarang Village, West Kalimantan (1939–2025)

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### ABSTRACT

*This article examines the historical transformation of Suti Semarang Village in Bengkayang Regency, West Kalimantan, from its mythological origins in the Semorongk–Siti legend to its contemporary form as a modern administrative village (1939–2025). Focusing on the Dayak Bemoyo sub-ethnic group, the study addresses a significant gap in the literature, which has largely overlooked the long-term socio-cultural resilience of this community amid administrative restructuring, economic change, and external shocks such as the COVID-19 pandemic. Guided by three central questions—concerning the village’s pre-1939 history, its formal establishment and renaming in 1969, and the evolution of its social, economic, and cultural practices—this research integrates oral histories, field observations, village documentation, and official records within a constructivist-interpretivist paradigm. The findings reveal that core Bemoyo elements, including origin myths, gotong royong, hutan tembawang management, and ancestral veneration, have not disappeared but have been functionally transformed. What were once primarily practical and ritual practices have increasingly become symbolic resources for identity maintenance and social cohesion. This study argues that Dayak Bemoyo intangible cultural heritage is sustained not through rigid preservation but through adaptive reinvention. It contributes to broader scholarly discussions on cultural resilience, the invention of tradition, and rural modernity in Borneo.*

*Keywords: Dayak Bemoyo; socio-cultural resilience; intangible cultural heritage; cultural adaptation; rural transformation; West Kalimantan.*

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### INTRODUCTION

Names and origins carry profound power in Borneo. In many Dayak communities, the stories of how villages and ethnic identities were formed often blur the boundary between myth and history.

These narratives do not merely explain the past; they continue to shape contemporary claims to belonging, territory, and cultural legitimacy (Adi Wijayanto, 2023; Deo et al., 2025; Kumpiady Widen, 2024; Muhammad Syaifulloh, 2014). In the context of rapid modernisation and administrative reform, such origin stories become strategic resources through which communities negotiate resilience amid change.

Suti Semarang Village in Bengkayang Regency, West Kalimantan, presents a rich case for understanding this dynamic. Originally known as Kampung *Semorongk*, the village traces its foundation to the *Semorongk–Siti* legend, which tells of a spiritually powerful ancestor who travelled to Java and returned with his wife to establish the first *Bemoyo* community. This mythological origin, reinforced by material traces such as hutan tembawang, ancient graves, and remnants of longhouse pillars (*kayu beliang*), continues to anchor the community's identity even as it has transformed into a formally recognised administrative village.

Scholars have long observed that village formation in West Kalimantan cannot be separated from broader historical forces, including migration patterns, colonial administration, missionary activities, and post-independence development policies (Muafi HIMAM, 2018; Tanasaldy, 2014). Law No. 6 of 2014 concerning Villages has granted greater autonomy to rural communities; yet in practice, state-driven development frequently prioritises economic productivity, infrastructure, and integration into wider markets over the safeguarding of historical memory and customary knowledge (REKHA A/P SELVARAJOO, 2022; Yesi Belina Oktaviana, 2024).

Within Dayak societies, cultural practices have repeatedly demonstrated remarkable adaptability. The transformation of *kuntao* among the Iban—from a martial art rooted in self-defence to a performative expression of identity—illustrates how tradition can be reinterpreted without losing its symbolic power (Jiton et al., 2025; Green, 2001). Similar patterns appear in the management of *hutan tembawang*, *gotong royong*, and ancestral rituals among various Dayak groups, where functional roles gradually shift toward symbolic and educational purposes (Jiton et al., 2025; Joon & Bmm, 2022; Syaifulloh, 2019a).

Despite growing scholarship on Dayak cultural heritage, significant gaps remain. Most studies on village history in West Kalimantan are either short-term ethnographic accounts or broad regional analyses that rarely trace the long-term evolution of a single sub-ethnic group across nearly nine decades (Sindia et al., 2025; Wiranto & Setyawan, 2025). Research specifically addressing the *Bemoyo* sub-ethnic group is particularly scarce. While studies on intangible cultural heritage (ICH) have increased following UNESCO's 2003 Convention, few have examined how smaller Dayak communities actively rework mythical narratives and customary practices to maintain identity within modern administrative structures (Eilenberg, 2022; Murdani, 2024).

This study therefore seeks to bridge that gap by offering a longitudinal analysis of Suti Semarang Village from 1939 to 2025. It examines how the Dayak *Bemoyo* community has navigated the transition from a forest-based, longhouse-oriented society to a modern rural village marked by commercial agriculture, bureaucratic integration, and the impacts of the COVID-19 pandemic. Drawing on the theoretical insights of Hobsbawm and Ranger (Hobsbawm & Ranger, 2012; Junaidy et al., 2024) on the “invention of tradition” and Connerton (Vivian et al., 2024) on

social memory, this research views cultural resilience not as static preservation but as a continuous process of reinterpretation and adaptation.

Theoretically, the study is situated within constructivist-interpretivist and historical approaches. It understands identity as fluid and relational (Covarrubias Venegas, 2019; Kuprii, 2024; Viseu, 1999; Vivian et al., 2024), shaped by the interplay between local agency and external structural forces. Rather than treating *Bemoyo* identity as a fixed ethnic essence, this article explores how it is actively constructed through origin myths, genealogical claims, customary practices, and responses to administrative reform.

The research is guided by three central questions: First, what was the historical and cultural condition of the *Bemoyo* community in the region prior to 1939? Second, how did the village achieve formal shape in 1939, and what processes led to its official renaming as Suti Semarang in 1969? Third, how have the social, economic, and cultural dimensions of village life evolved between 1939 and 2025, particularly in response to administrative change, economic transformation, and the COVID-19 pandemic?

By addressing these questions, this article contributes to the growing body of scholarship on rural Borneo by demonstrating that intangible cultural heritage remains vibrant precisely because communities possess the capacity to reinvent tradition in response to changing realities.

## RESEARCH METHODS

This study employs a qualitative, historically grounded ethnographic approach to trace the long-term transformation of Suti Semarang Village and its *Dayak Bemoyo* community. Recognising that identities and cultural meanings are fluid and socially constructed, the research is situated within a constructivist-interpretivist paradigm (Creswell & Poth, 2018; Miles et al., 1994). This perspective views historical realities as best understood through the lived experiences, memories, and interpretive frameworks of local actors across generations (Wesley-Esquimaux, 2020).

A longitudinal design was adopted, enabling deep engagement with the community over an extended period. Fieldwork was conducted intermittently between 2023 and 2025, allowing the researcher to observe changes and build trust with informants. Primary data were generated through a combination of semi-structured interviews, field observations, and documentary analysis. Five key informants were purposively selected based on their depth of historical and customary knowledge: Samuel S.Th (50 years, Village Head), Bingkes (96 years, customary elder), Makeng (66 years, customary elder), David (64 years, *ketua adat*), and Markus Sasi (45 years, Head of RT 01). These individuals represent both older and middle generations, providing critical perspectives across temporal layers of memory.

Interviews, lasting between 60 and 120 minutes, were conducted face-to-face in the informants' homes. Rather than treating oral accounts as mere factual data, the researcher applied a hermeneutic sensitivity (Patterson & Williams, 2002), seeking to understand not only what was remembered but how and why certain memories were emphasised or silenced. Site visits to *hutan tembawang*, ancestral graves, former longhouse sites, and ritual locations served as

important mnemonic anchors, allowing the material landscape to converse with oral narratives. Genealogical records, village documents, photographs, and official archives concerning the 2002–2003 sub-district division were triangulated with these sources to strengthen interpretive reliability and address gaps in recall.

Secondary data included academic works on Dayak societies, village governance, and intangible cultural heritage, as well as official statistical records from the sub-district office. Population data were analysed to map demographic shifts from approximately 200 inhabitants in the late 1930s to 4,579 by 2025. Rather than treating quantitative data as central, these figures were used to contextualise and corroborate qualitative findings regarding migration, administrative reorganisation, and social change.

Data analysis followed an iterative process. Descriptive-chronological reconstruction was used to organise events across time, while analytical interpretation focused on identifying functional shifts in customary practices, the reworking of myths, and patterns of socio-cultural resilience. Following (Patterson & Williams, 2002) special attention was given to how social memory operates through both narrative and embodied practices. Triangulation across oral, material, and documentary sources, combined with member checking whereby key findings were returned to informants for verification and feedback, enhanced the trustworthiness of the interpretation.

Ethical considerations were paramount. Informed consent was obtained from all participants, and cultural protocols were respected, particularly when discussing sacred knowledge and ancestral narratives. The study recognises its limitations, including the relatively small number of informants and the challenges of conducting fieldwork during and after the COVID-19 pandemic. Nevertheless, the combination of longitudinal engagement, methodological triangulation, and theoretical reflexivity has enabled a nuanced understanding of how the *Bemoyo* community sustains its identity through continuous adaptation.

## LITERATURE REVIEW

Village histories in Indonesia are inherently intertwined with processes of migration, adaptation, and negotiation with state power. As the smallest formal unit of community governance, the *desa* has long served as both a site of cultural continuity and an instrument of national development (Lutfi Al Fathi et al., 2026; Sani Deta, 2025). Law No. 6 of 2014 concerning Villages grants rural communities greater autonomy to manage their affairs based on customary norms and original rights. In practice, however, development policies have frequently prioritised economic growth, infrastructure expansion, and integration into market systems, often at the expense of historical memory and cultural preservation (Robiyanto et al., 2022; Streimikiene et al., 2021).

Within West Kalimantan, *Dayak* communities have demonstrated remarkable socio-cultural resilience amid repeated transformations. Longhouse settlements, animist belief

systems, *gotong royong*, and forest management practices such as *hutan tembawang* have persisted, even as their functions have shifted across time (Syaifulloh, 2016; Wibowo et al., 2024). Studies on the *Dayak Bidayuh* in Singkawang and the *Dayak Iban* in Sarawak show that customary practices rarely disappear completely; instead, they are reinterpreted to meet new social, economic, and political realities (Aurellia Ressi, 2024; Syahputra et al., 2024). The transformation of *kuntao* from a martial tradition into a performative art form is one clear example of how cultural elements can be preserved through adaptation rather than rigid continuity (Devitaria et al., 2023; Jiton et al., 2025).

These dynamics are closely related to the concept of intangible cultural heritage (ICH). UNESCO (2020) defines ICH as practices, representations, expressions, knowledge, and skills that communities recognise as part of their cultural heritage. In Borneo, elements such as origin myths, ancestral veneration, traditional music, weaving, and forest management fall within this category. However, modernisation, Christianity, tourism, and administrative reform have created complex challenges. As sacred and ritual elements are increasingly performed for public audiences, questions arise regarding authenticity, commodification, and the potential loss of deeper spiritual meanings (Precillia, 2025; Syaifulloh, 2019b).

Theoretical contributions from (Hobsbawm & Ranger, 2012) on the “invention of tradition” and (Kuprii, 2024) on social memory provide valuable lenses for understanding these processes. Traditions are not static relics of the past but are continuously recreated to serve present needs. Similarly, (Rogers Brubaker, 2006) remind us that ethnic and cultural identities are not fixed essences but relational and situational categories shaped by political, economic, and historical contexts. In Borneo, where colonial administration, missionary activities, and post-independence policies have repeatedly redrawn boundaries and classifications, such theoretical insights are particularly relevant.

Despite a growing body of literature on *Dayak* societies and rural development in West Kalimantan, important gaps persist. Most studies remain either broad regional surveys or short-term ethnographic accounts focused on major ethnic groups such as the Iban, Kantuk, or Bidayuh (Joon & Bmm, 2022). Research that specifically examines smaller sub-ethnic groups like the *Bemoyo* over a long historical span (1939–2025) is still limited. Furthermore, few studies have systematically analysed how mythological narratives, customary practices, and community resilience interact with administrative restructuring, commercial agriculture, and contemporary crises such as the COVID-19 pandemic (Postill, 2000).

Existing scholarship on intangible cultural heritage in Indonesia has tended to focus on documentation and preservation strategies, often within formal policy frameworks. While valuable, these studies rarely explore the lived, everyday processes through which communities actively reinterpret their heritage to maintain identity amid structural change (Syaifulloh, 2016). There remains a need for grounded, longitudinal case studies that bridge mythological origins, historical experience, and contemporary adaptation.

This study addresses these gaps by offering a detailed historical ethnography of Suti Semarang Village and the *Dayak Bemoyo* community. By integrating oral histories, material traces, and official records, it examines how one community has sustained its cultural core while continuously adapting to changing political, economic, and environmental conditions. In doing so, it contributes to theoretical debates on socio-cultural resilience, the dynamic nature of tradition, and the politics of memory in rural Borneo.

## RESEARCH FINDINGS

### *Profile of Informants and Demographic Dynamics*

The strength of this study lies in the depth of oral testimonies provided by five key informants who collectively represent multiple generations of *Bemoyo* cultural memory. Bingkes (96 years) and Makeng (66 years), both customary elders, offered extensive historical narratives that reach back to the pre-1939 period. David (64 years), the *ketua adat*, provided detailed accounts of ritual practices and customary law. Samuel S.Th (50 years), the current village head, and Markus Sasi (45 years), Head of RT 01, contributed contemporary perspectives on governance and social change. Their accounts were cross-verified through triangulation with documentary sources and field observations. Table 1 presents their profiles.

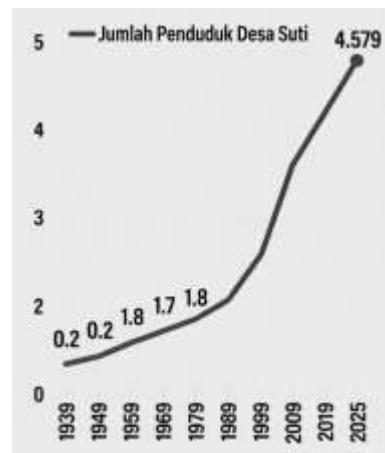
TABLE 1. Categories of Research Informants

No	Informant Name	Age (Years)	Position/Role	Customary Knowledge*
1	Samuel S.Th	50	Village Head	100%
2	Bingkes	96	Customary Elder	100%
3	Makeng	66	Customary Elder	100%
4	David	64	Ketua Adat	100%
5	Markus Sasi	45	Head of RT 01	100%

\*Note: Customary knowledge was assessed qualitatively based on each informant’s ability to explain history, genealogies, and *Bemoyo* customary practices.

Demographic records show a dramatic transformation. In the early years (1939–1960s), the village was a small settlement of roughly 40 households and approximately 200 people. By 2025, the population had grown to 4,579. This expansion, illustrated in Figure 1, was driven by natural increase, migration, and especially the administrative effects of sub-district formation in 2002–2003. Informants noted that while population growth brought improved infrastructure, it also weakened intimate social bonds that once characterised village life.

FIGURE 1. Population Growth in Suti Semarang Village (1939–2025)



Source: Processed from interview data and sub-district census, 2025.

### ***Mythic Origins and Pre-1939 History***

The *Semorongk–Siti* legend remains the cosmological foundation of *Bemoyo* identity. All informants recounted that *Semorongk*, a spiritually powerful ancestor, meditated in the deep forest, travelled to Java, married Siti, and returned to establish the first settlement. This myth functions as what (Kuprii, 2024) calls a “mnemonics of the body” — it is repeatedly performed in oral storytelling, ritual, and attachment to landscape. The early community lived in longhouses, practised hunting, resin collection, and maintained strict customary law centred on harmony with nature and ancestors.

A major fire destroyed the original settlement (*Tembawang Hangus*), forcing relocation. The surviving *hutan tembawang*, *kayu beliang*, and ancestral graves continue to serve as physical evidence and living memory anchors. These material traces do not merely support oral history; they actively shape how the community understands its past and claims its identity in the present.

### ***Village Formation in 1939 and Renaming in 1969***

The year 1939 marked a deliberate act of unification. Leaders from scattered hamlets agreed to form a single community for stronger social organisation and protection. This event is remembered as the formal birth of the village. The late *Lingga* played a pivotal role in the early years, maintaining customary law and mediating with outsiders.

In 1969, the village was officially renamed *Suti Semarang*. This was a conscious cultural act to honour the ancestral couple. The renaming strengthened collective identity at a time when Christianity was gaining influence. Traditional elements such as *perang mandau*, hunting

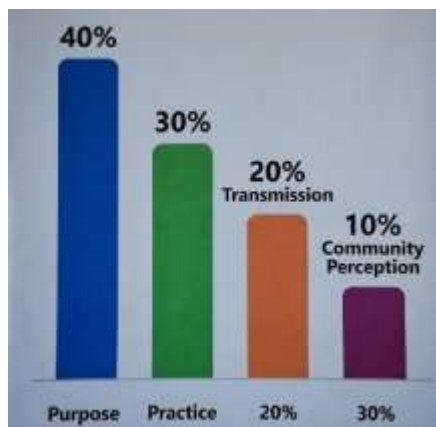
practices, and the ritual use of *ketawak/gong* remained important, serving both practical and symbolic functions during this transitional period.

### ***Social, Economic, and Cultural Evolution (1939–2025)***

From 1939 to 2025, Suti Semarang experienced continuous transformation across multiple domains. The arrival of Christianity in the late 1960s altered spiritual life, yet many *Bemoyo* values persisted in adapted forms. Economically, the community shifted from forest-based subsistence to commercial agriculture. The creation of the sub-district in 2002–2003 accelerated infrastructure development but also contributed to the decline of certain ritual intensities.

The COVID-19 pandemic (2020–2021) tested the community’s resilience. When formal systems faltered, customary networks of mutual assistance and the use of village resources proved vital for survival. Figure 2 shows how informants perceived changes in the functions of custom. The data indicate a clear shift: practical and ritual purposes have diminished, while the role of custom in reinforcing identity and social cohesion has become more prominent.

FIGURE 2. Changing Functions of Custom in Suti Semarang Village



Source: Qualitative analysis of interview data, 2025.

## **DISCUSSIONS**

### ***Shifts in the Functions and Meanings of Dayak Bemoyo Custom***

The empirical findings clearly show that customary practices in Suti Semarang Village have undergone significant functional shifts from 1939 to 2025. Practices that were once primarily practical and ritual-oriented — such as *gotong royong* for mutual survival, *hutan tembawang* management for subsistence, and ancestral rituals for spiritual protection — have gradually transformed into symbolic resources that serve identity affirmation and social cohesion. This

transformation is not a sign of cultural decline, but rather an adaptive strategy. As one elder informant stated, “Adat dulu untuk hidup, sekarang adat untuk ingat siapa kita.” This emic perspective strongly resonates with (Hobsbawm & Ranger, 2012) concept of the invention of tradition, whereby cultural elements are selectively preserved and reinterpreted to fit contemporary needs.

The administrative restructuring in 2002–2003 and the COVID-19 pandemic further accelerated this shift. When formal government support was limited during the pandemic, customary networks based on *gotong royong* and communal solidarity became critical coping mechanisms. These observations confirm that *Bemoyo* custom is not a static relic but a living, flexible framework that adjusts its functions according to changing social, economic, and environmental conditions.

### ***Socio-Cultural Resilience and Modernisation***

The concept of socio-cultural resilience emerges as a central theme in this study. Rather than being eroded by modernisation, *Bemoyo* identity has shown considerable adaptive capacity. The community has managed to maintain core values — unity, respect for ancestors, and mutual assistance — even as external forms (longhouse living, hunting practices, and ritual intensity) have changed. This finding supports (Sani Deta, 2025) argument that identity in frontier regions is relational, situational, and continuously negotiated.

Compared with other Dayak groups, the *Bemoyo* experience shows both similarities and unique characteristics. While the Iban have transformed *kuntao* into a performative art (Jiton et al., 2025), the *Bemoyo* have repurposed origin myths and *hutan tembawang* as symbols of historical continuity and territorial belonging. The COVID-19 pandemic provided a particularly clear test: when mobility was restricted, the community reverted to traditional knowledge of local food sources and strengthened social networks rooted in customary values. This demonstrates that resilience is not passive preservation but an active, creative process of cultural reinvention (Kuprii, 2024).

### ***Theoretical Contributions***

This research makes two main theoretical contributions. First, it enriches the literature on intangible cultural heritage by showing that ICH in small Dayak sub-ethnic groups is sustained through dynamic adaptation rather than rigid conservation, thus extending UNESCO’s (2020) framework. Second, it supports (Rogers Brubaker, 2006) critique of ethnicity as a fixed category by demonstrating how *Bemoyo* identity is fluid, context-dependent, and strategically mobilised through myths, landscape, and customary practices.

By focusing on a long historical period (1939–2025) and a relatively understudied sub-ethnic group, this study fills an important gap in West Kalimantan scholarship, which has been dominated by research on larger groups or short-term ethnographic studies .

### ***Practical Implications and Recommendations***

The findings have several practical implications. First, there is an urgent need for systematic documentation of *guru adat* knowledge, genealogies, and oral histories before this knowledge disappears with the older generation. Second, village history and *Bemoyo* cultural values should be integrated into local school curricula (*muatan lokal*) to strengthen cultural transmission among the youth. Third, community-based cultural tourism centred on *hutan tembawang*, ancestral graves, and traditional performing arts can be developed, provided it is managed with cultural sensitivity and community control. Fourth, village governments should allocate part of *Dana Desa* specifically for cultural preservation programmes. Finally, closer collaboration between universities, local government, and indigenous communities is essential to balance development goals with heritage protection.

### ***Limitations of the Study***

This study is a single-village case study relying heavily on oral sources from five key informants. While triangulation and member checking were rigorously applied, the findings cannot be generalised to all Dayak communities in West Kalimantan. Future research could compare the *Bemoyo* experience with other small sub-ethnic groups to provide a broader understanding of cultural resilience in Borneo.

## **CONCLUSION**

This study has traced the historical evolution of Suti Semarang Village from its mythological origins in the *Semorongk–Siti* legend to its present form as a modern administrative village (1939–2025). It has shown how the *Dayak Bemoyo* community has continuously adapted to administrative reform, economic change, religious conversion, and the COVID-19 pandemic without severing its cultural roots.

The findings demonstrate that core *Bemoyo* elements — origin myths, *gotong royong*, *hutan tembawang* management, and ancestral veneration — have not disappeared but have been functionally transformed. What were once primarily practical and ritual practices have increasingly become symbolic resources for identity maintenance and social cohesion. This dynamic illustrates that intangible cultural heritage is sustained through adaptation and reinvention rather than rigid preservation.

Theoretically, this research contributes to broader debates on cultural resilience in Borneo by showing that even small sub-ethnic groups actively reinterpret tradition in response to external

pressures. It supports Hobsbawm and Ranger's (1983) notion of the invention of tradition and Connerton's (1989) concept of social memory as an active practice. By focusing on a long-term historical ethnography of the *Bemoyo*, this study fills a notable gap in West Kalimantan scholarship, which has largely overlooked smaller groups in favour of larger ethnic categories.

Despite its limitations as a single-village case study, this research highlights the importance of documenting local histories and customary knowledge before they fade. It calls for greater integration of indigenous perspectives into development planning and cultural policy. Ultimately, the story of Suti Semarang suggests that true cultural resilience lies not in resisting change, but in the community's capacity to remake tradition while preserving its essential meaning.

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## Tracing Chinese Migration to Sampadi, Sarawak: A Historical Ethnography of Cultural Integration and Settlement

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### ABSTRACT

*This paper examines the historical migration and settlement of Chinese communities in Sampadi, Sarawak, focusing on how distinct dialect groups—Hakka, Teochew, and Lei Chou—integrated with local Dayak populations. Drawing upon oral histories, archival sources such as the Sarawak Gazette, genealogical records, and ethnographic observations, the study reconstructs the processes through which migrants adapted economically and culturally within a colonial frontier zone. Methodologically, it combines field interviews (n=20) with documentary analysis and site-based ethnography. Findings reveal that Sampadi served as both an economic settlement and a cultural crossroads, where intermarriage, linguistic blending, and hybrid rituals created a localized model of cultural integration. By situating these dynamics within broader frameworks of diaspora, transnationalism, and hybridity, the study contributes to understanding how peripheral settlements like Sampadi illuminate the micro-histories of Chinese migration in Southeast Asia and the negotiation of identity in plural societies.*

*Keywords: Chinese migration; Sampadi; Sarawak; Hakka, Teochew, Lei Chou; Dayak; cultural integration.*

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### INTRODUCTION

Chinese migration into Southeast Asia has profoundly shaped the region's demographic, economic, and cultural landscape since the seventeenth century [Reid, 1993; Heidhues, 1974]. While much scholarship centers on major port cities such as Singapore or Penang, smaller settlements like Sampadi in western Sarawak remain underexplored. Situated between Kuching and Lundu along the South China Sea, Sampadi evolved from a colonial agricultural node into a multiethnic community characterized by Chinese–Dayak coexistence.

This study addresses that gap by examining how Hakka, Teochew, and Lei Chou migrants—arriving in successive waves between the late nineteenth and early twentieth centuries—settled, intermarried, and integrated with local Dayak groups. The Dayaks, indigenous to Borneo, were historically animist agrarian communities whose social systems provided both labor alliances and kinship opportunities for Chinese settlers [Ho, 2012]. Sampadi thus offers a lens through which to study frontier adaptation, local hybridity, and the maintenance of cultural continuity within migrant diasporas.

The significance of this research lies in uncovering how localized migration histories, often excluded from mainstream colonial and national narratives, contribute to broader understandings of identity formation and intercultural negotiation in multiethnic Malaysia.

## **METHOD AND APPROACHES**

### ***Fieldwork and Oral Histories***

Fieldwork took place between October 2017 and March 2018 in Sampadi and surrounding areas. Twenty informants—descendants of early settlers, local elders, and temple custodians—were selected via snowball sampling based on community reputation and lineage accessibility. Interviews were semi-structured, focusing on migration origins, routes, intermarriage, occupational patterns, and ritual continuity. Data were cross-validated by triangulating oral accounts with tombstone inscriptions, genealogical archives, and colonial records (See supplementary data).

### ***Archival and Documentary Analysis***

Primary sources consulted include the Sarawak Gazette (1885–1950s), clan genealogies, and local land registries. Secondary sources (Chew, 1990; Ji, 2018; Ho, 2012; Lie, 2004) provided comparative context for interpreting oral narratives. Ethnographic observations, including religious ceremonies, linguistic usage, and funerary customs, were documented through participant observation at festivals and visits to grave sites such as Sungai Nguan, Sungai Limo, and Bukit Kualu.

### ***Data Interpretation***

The study employs a historical ethnography approach, integrating micro-historical reconstruction with interpretive anthropology. Oral histories were coded thematically (migration motives, settlement, integration, memory), while material sites (graves, factory ruins) served as mnemonic landscapes indexing cultural continuity.

## **SCOPE AND LIMITATION**

### ***Historical Background***

#### ***Early Maritime Networks***

Chinese maritime connections to Southeast Asia date back to the Tang and Song dynasties, but intensified during the Ming and Qing periods, when traders ventured to Melaka, Java, and Borneo.

In West Borneo, Hakka migrants established Kongsis mining federations such as Lan Fang, which combined governance and cooperative labor [Ji, 2018; Yuan, 2000]. Following the Dutch suppression of the Kongsis (1850–1854), displaced Chinese miners crossed into northern regions, laying foundations for settlements in Sarawak, including Sampadi.

### ***Colonial Context and Land Development***

Under the Brooke Raj (1841–1941), Sarawak’s economy was restructured around plantations, with emphasis on gambier, pepper, coconut, and charcoal industries. Colonial administrators such as James Brooke and later his nephew Charles encouraged Chinese settlement through labor recruitment and land concessions. Sampadi was identified as a promising agricultural frontier, with figures like James Scott (“Tuan Scott”) and Towkay Yeo Ban Hok serving as intermediaries between colonial authorities and Chinese laborers.

### ***Migration Routes to Sampadi***

Migration occurred via two primary channels:

#### ***Overland Routes***

Post-Kongsis War refugees followed mountainous paths from Montrado and Sadas (present-day Indonesia) into Sarawak. Route A—via Serikin to Bau—was associated with Liu Shan Bang and the remnant miners of the Shi-Wu Fen Kongsis. Route B connected Sadas–Tebedu–Semanggang–Engkilili–Murup, facilitating gradual movement toward Sampadi. Oral accounts describe hazardous jungle crossings, which allowed small family groups to evade colonial surveillance while maintaining kin-based settlement clusters.

#### ***Maritime Routes***

Steamships from Singapore and Pontianak carried laborers to Kuching, where flat-bottomed river craft continued inland via Muara Tebas and Rambungan to Sampadi. For many Teochew and Lei Chou families, including the Phangs and Khos, maritime arrivals in the late nineteenth century preceded agrarian ventures in pepper and gambier. Sampadi’s tidal and riverine geography shaped both its accessibility and isolation, influencing settlement duration and cultural retention.

### **Socioeconomic and Cultural Dynamics**

#### ***Agricultural and Industrial Development***

Chinese settlers transformed Sampadi’s ecology through plantation agriculture. Teochews specialized in gambier processing, leveraging proximity to river systems for boiling and transport, while Lei Chou migrants established charcoal factories that remain partially operational. Hakka settlers diversified into coconut and pepper cultivation. Oral records cite intergenerational transfer of agricultural knowledge and family enterprises such as the Goh and Lim households, whose descendants maintain farms today.

### ***Cultural Integration and Hybridization***

Ethnic integration was facilitated through marital alliances between Chinese men and Dayak women. Unlike more segregated multiethnic zones elsewhere, Sampadi's intermarriages produced hybrid households characterized by blended rituals, foodways, and linguistic codes. Hakka, Teochew, and Dayak languages coexisted within family settings, fostering a creolized environment without institutionalized barriers. Ritual syncretism is evident in funerary practices incorporating both Chinese ancestral rites and Dayak animist offerings.

This fusion aligns with broader anthropological frameworks of hybridity and localized diaspora, wherein migrants retain cultural identity while negotiating belonging through everyday exchange [Skinner, 1996; Reid, 1993].

### ***Key Personalities and Local Agency***

Three figures illustrate Sampadi's entangled colonial economy:

James Scott ("Tuan Scott"): Engineer and landowner who developed plantations and later transferred ownership to local Chinese families such as that of Wu Ji An, signifying localized redistribution of colonial property.

Towkay Yeo Ban Hok: Prominent merchant and Ban Hock port owner whose economic ventures facilitated labor migration and trade between Kuching and Sampadi. His enterprises linked colonial agricultural needs with Chinese entrepreneurship.

The Kho Family (Teochew lineage): Mixed farming and shipping family connected through economic and marital, as well as local administration. Their integration into local society, exemplified by Kho Tai Moi's adoption of Dayak kin, embodies Sampadi's pattern of cultural synthesis.

### ***Material Heritage and Memory Landscapes***

Sampadi's spatial history persists in its landscape: riverside cemeteries, charcoal kilns, gambier factory remnants, and ancestral tombs record overlapping ethnic and temporal identities. Inscriptions at sites such as Sungai Nguan reveal lineage origins (Lei Chou, Hakka, Teochew) and attest to continued local stewardship by families like the Gohs and Wongs. These places function as mnemonic sites reaffirming transgenerational belonging—what Nora (1989) would term *lieux de mémoire*—anchoring diasporic memory within rural Sarawak.

### ***Discussion: Reframing Migration and Hybridity***

This ethnographic reconstruction situates Sampadi as a microcosm of diasporic adaptation and localized modernity. The study challenges urban-centric narratives of Chinese migration by foregrounding peripheral rural experiences. Sampadi's community exemplifies what Clifford (1997) describes as routes rather than roots—mobility embedded in local reterritorialization.

Intermarriage and cultural fusion enabled social cohesion, suggesting that identity in Sampadi operated through negotiated hybridity rather than assimilation. Gendered dynamics—Chinese male entrepreneurs and Dayak female mediators—played crucial roles in sustaining both economic productivity and kinship legitimacy. The coexistence of ancestral Chinese rituals and indigenous practices illustrates not assimilation but mutual incorporation, rooted in shared settlement histories and economic pragmatism.

## CONCLUSION

Sampadi's history exemplifies how migration, adaptation, and memory intertwine within a frontier community. Through oral histories and archival synthesis, this study reveals that Chinese settlers in Sampadi did not merely transplant their culture but reconstituted it through interaction with Dayak society and colonial structures.

The study contributes to Southeast Asian migration studies by (1) documenting a localized model of Chinese–Dayak integration; (2) demonstrating how micro-ethnographic methods illuminate subaltern migration histories; and (3) proposing a framework for analyzing cultural hybridity beyond assimilation paradigms. Future research could extend comparative analysis to neighboring Lundu and Bau or examine intergenerational identity transmission among mixed-descent descendants in contemporary Sarawak.

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## Linguistic Ambiguity and Indigenous Cognition in Iban *Entelah*: A Structural, Cognitive, and Pragmatic Analysis

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### ABSTRACT

*This study examines the structure, cognitive processes, and pragmatic strategies that shape ambiguity in entelah, the traditional Iban riddle genre. Although Iban riddles are rich in cultural knowledge and poetic language, previous research has often analysed them through Western frameworks, which do not fully reflect indigenous perspectives. To address this gap, the study investigates the structural terminology unique to entelah and explores how riddle givers use linguistic ambiguity to conceal meaning and guide interpretation. The research draws on mixed methods, combining ethnographic fieldwork in Saratok with a corpus-based linguistic analysis of 338 riddles, consisting entries from Entelah (Tun Jugah Foundation, 2019). The analysis identifies how Iban riddle givers employ devices such as ulu lungga (hint) (phonological clues), menua lama and menua baru (metaphorical imagery), lexical ambiguity, and culturally grounded cognitive categories to construct riddles that challenge solvers and transmit world knowledge. Findings show that ambiguity in entelah arises from both linguistic and cultural processes, including violations of salience, shifts in accessibility hierarchy, parallelism, and the use of deep and shallow Iban registers. The study contributes to a deeper understanding of Iban verbal art by demonstrating that riddling is a sophisticated linguistic act embedded in cultural cognition, intergenerational knowledge transmission, and poetic performance traditions.*

*Keywords: Entelah; ambiguity; cognition; structure; pragmatic.*

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### INTRODUCTION

The Iban, historically known as the Sea Dayaks of Borneo and once renowned for their headhunting practices, have in recent generations become more settled in their longhouse communities. Contemporary Iban society is characterised by concerns such as land rights, rice

cultivation, traditional weaving, the preservation of heirloom collections, and the continuation of ritual practices. Their deep engagement with land conservation and environmental stewardship is frequently reflected in *entelah*, which often feature plants, animals, and human actions and inactions as central motifs.

*Entelah*, the traditional Iban riddle, is a distinctive oral genre that combines poetic language, cultural symbolism, and playful ambiguity. Far more than a simple question-and-answer activity, *entelah* functions as a medium for transmitting environmental knowledge, moral values, and worldviews across generations. Iban riddles draw heavily on *jaku kelaung* (concealed language), where imagery and metaphor are deliberately crafted to obscure meaning and challenge the solver (Sather, 2016). Their structure typically consists of a riddle statement (*saur*), a phonological clue (*ulu lungga*), and an answer (*lalai*), forming a communicative act rooted in both linguistic artistry and social interaction (Osip, 2006). Earlier studies also highlight the importance of indigenous interpretive frameworks, as many Iban riddles rely on cultural categories and cosmological concepts that differ from Western definitions of “true riddles” (Kaivola-Bregenhøj, 2017; Pepicello & Green, 1984). As a result, *entelah* offers valuable insight into Iban cognition, aesthetics, and communal knowledge-making, making it a significant component of their oral heritage.

The analysis of folk riddles is commonly grounded in two key frameworks: a cultural framework and a linguistic framework. The cultural framework provides the context for studying manipulative language, often deemed different from other existing forms of social interaction, whilst the linguistic framework helps govern how information is conveyed. Both processes appear fairly straightforward, but appearances can be deceiving. Riddling is unlike other forms of social interaction where clear expression of ideas is expected; it involves processes whereby the riddle giver purposefully conceals information from the riddle solver, with the aim of outwitting one another (Pepicello & Green, 1984). This concealment is understood differently by cultures worldwide (e.g. as fun, wit, wisdom, or intergenerational knowledge transmission). Moreover, many languages and cultures perceive riddles in ways that diverge significantly from Western conceptualisations (e.g. jest, gag, banter, prank, pun, and wordplay) (Kaivola-Bregenhøj, 2017). Furthermore, the conventional definition of a “true riddle” as comprising a two-part structure—namely a “question/image” and an “answer”—does not always hold across cultures (as will be demonstrated in relation to Iban). Consequently, by framing riddle structures and knowledge using non-emic (e.g. Eurocentric) analytical categories, researchers risk overlooking opportunities to represent indigenous conceptualisations of world knowledge on their own terms. As Goddard (2002) notes in his study of Malay in Southeast Asia, “indigenous terms and their cultures can disclose a world of meaning if they are subjected to soundly based semantic and linguistic scrutiny” (p. 114). This perspective highlights the importance of interpreting indigenous verbal forms through analytical lenses that respect local epistemologies rather than imposing external conceptual categories.

At present, gaining an insider understanding of a language’s pragmatics requires careful attention to cross-linguistic lexical meanings and how semantic priming shapes interpretation (Goddard, 2002). This approach is essential for understanding indigenous riddle cultures and their accompanying knowledge systems. However, this is not a straightforward endeavour given the considerable variation in riddle genres, registers, and functional categories found in Borneo, particularly in Sarawak. As anthropologist Harrisson (1965) noted, “Borneo material, even when

distinctive and locally specialised, cannot be treated in isolation” (p. 3). He explained that understanding cultural patterns requires consideration of local beliefs, the movements and interactions of other ethnic groups, and the surrounding environment. The Iban people of Sarawak possess a rich riddle tradition in which written and oral riddle-poems exist as “texts” in archives, publications, and personal collections. However, in practice, riddles are performed orally and improvised during communal events. The Iban riddling language (*jaku kelaung*) belongs to a specific speech genre used in rituals and is deeply connected to Iban worldviews. One prominent example is the Iban idea of “upside-downness,” which is central to their theology. This idea is not based on written tradition but is closely connected to how the community understands life and the stage that completes, rather than ends, death. Similarly, the visual and verbal mental images of the Iban universe are characterised by profound divisions (Harrisson, 1965; Ganing & Amat, 2017), and this imagery recurs throughout their epic narratives and riddles.

The Iban do not classify riddles as part of their formal rituals, yet they often use symbols and references connected to upper-world spirits in their riddling practices, as these are believed to bring material benefits to listeners (Sather, 2017). In this context, material benefit refers to how a community understands and relates to its environment. Weiner (1997) explains that the world knowledge embedded in folk riddles can shape a culture’s cognitive categories and belief systems, making such knowledge important to the linguistic framework, especially because of its links to the grammar of the language. Riddle givers also create new metaphors to hide meaning, challenge the audience, and make the riddle more engaging by using words and phrases that resemble other existing expressions.

Despite the cultural and linguistic richness of Iban riddles, there remains a significant gap in the literature concerning how *entelah* structures reflect indigenous cognitive and pragmatic strategies. Existing riddle scholarship has predominantly applied Western analytical frameworks, which may inadequately capture the emic perspectives of non-Western riddling traditions. Furthermore, little attention has been paid to how Iban riddlers manipulate linguistic ambiguity and cultural resources to encode world knowledge. To address these gaps, this study aims to: (1) introduce and analyse the structural terminologies specific to Iban *entelah*; and (2) explore the cognitive and pragmatic mechanisms underlying language ambiguity in Iban riddles; The paper will begin by clarifying key terminologies related to *entelah* structure. Among the Iban, riddles known as *entelah* are either “given” to children or presented before mixed audiences by riddle givers in the form of simple riddles and formulaic riddles. Following this, the study will examine various cognitive and pragmatic strategies for interpreting linguistic ambiguity in Iban, thereby contributing to a more culturally grounded understanding of this understudied riddling tradition.

## METHOD AND APPROACHES

This study employed a mixed-methods approach, combining ethnographic fieldwork with corpus-based linguistic analysis to examine the structural, cognitive, and pragmatic features of the *entelah*. The research design was informed by linguistic anthropology and cognitive linguistics, allowing for both qualitative interpretation of cultural practices and systematic analysis of linguistic patterns. This approach enabled the researchers to capture the dynamic nature of *entelah* as a living performance tradition whilst also identifying recurring structural and semantic features within the corpus.

Fieldwork was conducted in Saratok, Sarawak. This location was chosen because it is home to a recognised riddle expert cum informant and a community that actively maintains traditional Iban cultural practices, including riddling traditions. The study also utilised a corpus of 335 Iban riddles compiled in *Entelah* (Tun Jugah Foundation, 2019) a community-authored collection that represents both archival materials and contemporary riddles gathered from various Iban-speaking regions. This corpus provided a complementary dataset for structural and semantic analysis, allowing for comparison between recorded performances and documented textual forms. Each riddle entry in the corpus includes the riddle, its *ulu lunga* (*hint*) (clue), the answer, and contextual annotations where available.

Prior to commencing fieldwork, formal permission was obtained from the riddle expert following Iban protocols for engaging with traditional communities. The research objectives, methods, and expected outcomes were explained in Iban during initial community meetings, and informed consent was secured from the participant. All interviews and performance sessions were conducted in the Iban language by the lead researcher, who is proficient in Iban and familiar with local cultural norms. Audio and video recordings were transcribed and translated into English by the research team, with back-translation checks performed by native Iban speakers to ensure accuracy. Field notes were expanded and organised thematically on a daily basis during fieldwork.

The corpus of 335 riddles, supplemented by newly collected riddles from the fieldwork (totalling 338 riddles), was subjected to structural analysis to identify recurring patterns in riddle composition. This included categorisation of riddle types, examination of question-answer formats, and identification of formulaic expressions. Structural features such as syntactic parallelism, metaphorical mappings, and phonological play (e.g. homophony, alliteration) were systematically coded. Drawing on Natural Semantic Metalanguage (NSM) principles (Goddard, 2002) and cognitive metaphor theory (Lakoff & Johnson, 1980), the study analysed how world knowledge is encoded in *entelah*. This involved identifying conceptual domains, metaphorical entailments, and culture-specific semantic primes embedded in riddle language. Particular attention was paid to indigenous concepts such as cosmological divisions that shape Iban cognitive categories. Ethnographic data were analysed to explore the pragmatic functions of *entelah* in social interaction, including strategies for concealment, audience engagement, improvisation, and the negotiation of cultural knowledge. Thematic coding was employed to identify patterns in how riddle givers manipulate linguistic ambiguity and how solvers navigate interpretive challenges.

## FINDINGS AND DISCUSSION

This section presents an analysis of the structural terminologies specific to Iban *entelah* and the cognitive and pragmatic mechanisms underlying language ambiguity within these riddles. Examples drawn from the corpus and informants are referenced using the notation “R” followed by a number (e.g., R1). Riddles labelled R1, R2, and R12 are from the informants, meanwhile the rest are from *Entelah* (Tun Jugah Foundation, 2019).

### *The Structural Terminologies*

The term *entelah* (riddle) derives from the root word *telah* (to utter) and refers to an utterance or sequence of image representations. This etymological foundation provides a methodological entry point for analysing riddling as a communicative act. According to Ganing and Amat (2017), the

distinctiveness of Iban *entelah* lies in its structure, symbolic repertoire, and disguised meanings that conceal the *lalai* (answer). Sather (2016), on the other hand, sees this uniqueness in the poetic register known as *enteli main* (words of play), the formal structure of riddles, and the interpretative effort required to decode their meanings. Riddle givers generally employ rhythm, compositional patterns, and end rhymes to emulate naturally occurring prose whilst simultaneously departing from ordinary discourse. Central to this distinctive discourse are the concepts of *jaku dalam* (deep speech) and *jaku mabu* (shallow speech). Competent riddle givers often vary the depth of their riddles by shifting fluidly between these levels of language. Poet-bards (*lemambang*), given their extensive knowledge of Iban theology and cosmology, tend to be particularly adept at bridging movements between visible and invisible realms, thereby creating deeper layers of meaning. This ability enhances their reputation and results in poet-bards being sought after for presenting riddles during public performances and ceremonial occasions.

There are at least two principal contexts through which riddle knowledge is transmitted: the personal (familial) sphere and the public (communal) sphere. Within longhouse communities, parents and extended families invest in their children’s future well-being by sharing food, labour, and—crucially—knowledge with family and kin. Given the high value placed on resource accumulation, which encompasses the accumulated knowledge and experience of countless generations and takes considerable time to develop, skills such as environmental literacy and linguistic competence are greatly esteemed. In this context, parents typically allow grandparents or other respected adults to share stories and riddles with the young. The riddles presented to children are known as *entelah anembiak* (children’s riddles or elementary riddles). These riddles are brief and deliberately incorporate ambiguous word meanings, designed to help children notice, recognise, and categorise objects and phenomena in their environment. Importantly, the language and imagery employed in *entelah anembiak* are rarely considered “too deep” (*dalam*) for children; rather, they are calibrated to match children’s developmental and cognitive capacities whilst still encouraging interpretative engagement. The following examples of *entelah anembiak*, shared by the informant during fieldwork, illustrate these characteristics:

No.	Iban	English
R1	Tekura niki dinding  Ulu lungga: <u>Ku</u> li Lalai: <u>Ka</u> li	Tortoise climbs the wall  Answer: Wok
R2	Apai Jebu, apai Jebai, Nadai jari tau bepegai dikerigai tingkah batu, Apai jebu, apai jebi, Tegar bejalai nadai kaki, Bekerinci atas raung.  Ulu lungga: <u>Jag</u> ar Lalai: <u>Ula</u> r	Jebu’s father, Jebai’s father, No hand can hold stone boulders, Jebu’s father, Jebi’s father, Can walk fast without legs, Stands on dried grass.  Answer: Snake

According to Osup (2006), riddle givers also provide a clue known as the *ulu lungga* (hint) to reveal a phonological match between the riddle image and the answer. The *ulu lungga* can be any word with a similar end sound that matches the final sound of the answer. For instance, in R1, the

sound 'li' matches with *kuali* (wok). R2 bears a superficial resemblance to the Malay *pantun teka-teki* (poetic riddle), but the similarity largely ends there. Unlike the *pantun*, which is a fixed text reproduced from memory, the *entelah* is composed during performance or reassembled using pre-existing phrases and formulae drawn from ritual language (*jaku adat*). Consequently, no two performances of an *entelah* are exactly alike. Whilst the *entelah* can entertain in a manner reminiscent of English nursery rhymes (e.g. Humpty Dumpty), in practice, riddles such as R2 may serve pedagogical functions—for example, warning children about dangerous snakes that rear upright, such as cobras. R2 exemplifies a recurring formula emblematic of oral poets worldwide, wherein vivid imagery is employed to introduce the rich landscape, its abundant resources, and the dangers lurking nearby, utilising literary devices such as personification, hyperbole, and metaphor.

Most riddles are characterised by a two-part structure: the riddle question or image “offered” by the riddle-teller and the response provided by the riddle solver. Conventionally, scholars presuppose that the riddle question and answer jointly form a single cohesive unit (Dienhart, 1998; Pepicello & Green, 1984). Riddling, as a reciprocal communicative act, involves both the riddler (riddle giver) and the riddlee (audience or riddle solver). In Sarawak, *entelah* exists as a hybrid genre—part riddle, part poem—and is often “given” to young children by older relatives as part of personal culture or as a vehicle for intergenerational knowledge transmission. When presented to children, an answer is typically expected, as the purpose is to test wit and foster cognitive development. However, when performed in ceremonial or public contexts, *entelah* is regarded primarily as a means of transmitting intergenerational wisdom, environmental knowledge, and life skills; in such settings, an explicit answer is not mandatory, and interpretative engagement is valued over definitive resolution.

The riddling language, *jaku kelaung* (literally, “masked” or “concealed” language), is particularly significant in this regard. Ritual specialists and poet-bards invest considerable time and effort in crafting poetic riddles that employ *jaku kelaung*, drawing upon both *jaku dalam* (deep speech) and *jaku mabu* (shallow speech). This linguistic dexterity is accorded high prestige, particularly during the *leka main* ritual, where the ability to manipulate different registers of Iban is publicly celebrated (Sather, 2017). Poet-bards, as ritual professionals, characteristically employ allusive or obscure language to confuse, mystify, and impress their audiences—a hallmark of their craft. Consequently, ambiguity exists not only within the “question/image” component but also in the constituent parts that structure the riddle image (e.g. *ulu lungga* and *menua*), as well as in the lexical and phonological choices that render the riddle poetic.

Crucially, the cultural strategy underpinning riddling is to incorporate ambiguity seamlessly into the riddle structure without being excessively explicit about how or where that ambiguity operates. These inherent contradictions are not only expected but are accepted as an essential aspect of communicative competence within Iban culture. By investigating the ambiguity of *entelah* in terms of both cultural and linguistic acts, researchers can better comprehend how traditional communities conceptualise and deploy ambiguity, and how such practices remain culturally relevant in contemporary contexts.

A simple *entelah* typically takes the form of a short declarative statement (as in R3) or an imperative verb paired with an observation (as in R4).

No.	Iban	English
R3	Antu bekedumu dalam tanah  Ulu lungga: Pah babi Lalai: Buah Ubi	Spirit waiting in soil  Answer: Tapioca
R4	Patahka jari, patahka kaki, lalu simpan dalam sentubung  Ulu lungga: Main mana Lalai: Cheremin mata	Break a leg, break a hand, store in coffin  Answer: Spectacle

The term “riddle question,” however, can be misleading, as the *entelah* is “given” rather than asked in the form of a syntactic question. Whilst there are instances where the *entelah* takes the form of an interrogative statement—particularly during the initial composition or reassembly of riddle phrases—this is not the dominant structural pattern. This is illustrated in R3: “What is waiting in the soil?” or “What is the spirit waiting in the soil?” To an outsider unfamiliar with Iban cosmology and linguistic conventions, both the language structure and cultural representations embedded in such riddles can appear confusing, particularly when they invoke concepts such as “waiting spirits” or “coffins as storage containers.” However, these analogies are culturally intelligible and widely accepted within Iban society, given that the referents—such as tapioca and spectacles—are commonplace objects in daily life.

It is important to note that reading *entelah* from a written text, as in the present analytical context, necessarily limits the full riddling experience. This is because the written form denies access to the accompanying sound, rhythm, intonation, and performative effects of the riddling context, all of which are integral to the meaning-making process. In practice, *entelah* are “given” orally before a group of listeners, and the interplay between verbal artistry and audience engagement is central to the genre’s communicative force. In terms of indigenous terminology, the Iban refer to the riddle image, question, or statement as *saur*. The *saur* encompasses all means of articulating the riddle text, replete with its word knowledge (linguistic form) and world knowledge (cultural content). Importantly, the community tolerates a degree of flexibility when it comes to interpreting the language within the riddle, reflecting the dynamic and context-sensitive nature of oral performance.

When it comes to public performance, the oral presentation of *entelah* involves at least three parties: the riddle giver, the listener (or riddle solver), and the broader audience. The terms “audience,” “riddle giver,” and “riddle solver” are employed here to denote the respective groups that contribute to the riddling event, following the terminological frameworks established by Burns (1976). The audience typically comprises family members, kin, and guests of the riddle giver, creating a communal setting in which knowledge transmission and entertainment converge. Public performances may begin with a brief explanation or framing statement by the riddle giver, setting the tone and context for the riddling session that follows.

- Riddle giver** : 1. Thank you for coming.
2. Now I will give you five *entelah*.
3. **(Start)** *Berayang tunsang ruit* (inverted harpoon alerts village pre-dawn)
4. *Kampong tesau tumpau tumu* (turns village into turmoil)
5. *Simpau selang selit giga temu bunsu* (with twisted knots and invisible sources)
6. *Ulu lungga: batang lungkak*
- Riddle solver** : 7. The language is difficult. Is that a snake?
- Audience** : 8. Listen to *ulu lungga* (hint)“ak”
- Riddle solver** : 9. Sorry, I do not know
- Riddle giver** : 10. *Pemulak* (Liar)
- Audience** : 11. Ah... (smiles)
- Riddle giver** : 12. This *entelah* is deep. Talking about fake news.
13. We do not say what we want directly. This is part of the culture. Using different level. We must bring language to the higher level. (audience remain silent)
14. Let me explain. If I want tell a lie? You cannot find out what is true or a lie. If I tell you this, it sounds very nice but if you want to know you cannot. So I become a liar (*pemulak*).

The riddling process concludes at line 11. It remains unclear whether the meta-analytic statement in line 14 serves to explicate the answer provided in line 10 or functions as a form of philosophical rhetoric. What is evident, however, is that ambiguity is a richly layered concept in this context. Different approaches to interpreting public riddle performances may arise depending on the linguistic and cultural competencies of the audience. For instance, ambiguity on the part of the riddle solver may stem from limitations in understanding the language, particularly unfamiliarity with certain registers of Iban such as *jaku lama* (old or archaic Iban). One such example is the word *tunsang*, which refers to the Iban concept of “upside-downness”—a cosmological principle central to Iban theology and worldview. An audience member less familiar with this specialised vocabulary might interpret the answer in multiple ways. It could refer to: (a) an inverted spearhead, traditionally associated with deceit or a liar; or (b) a metaphorical representation of unverified news circulating on social media—a contemporary adaptation of the riddle’s referential scope. The fact that the answer is an abstraction reveals a deliberate strategy on the part of the riddle giver to

confuse, challenge, or even deceive the audience. However, given the community's belief in the interplay between visible and invisible forces, the interpretative possibilities are intentionally multidimensional. Often, it is precisely the depth of meaning and the cognitive challenges involved in matching sounds and semantic associations that motivate riddle givers to craft increasingly intricate and demanding riddles.

Overall, it is evident that riddling constitutes a popular form of social interaction, functioning simultaneously as poetry in motion and as playful verbal banter. The basic structure of an *entelah* requires at least three components: (A) the image or riddle statement (*saur*), (B) the hint with phonological clue (*ulu lungga*), and (C) the answer (*lalai*). A supplementary clue known as the *menua* (location or setting) is occasionally employed to provide additional context or to buy time during performance. The *menua* may itself contain witty or allusive language, though it will not be addressed in detail in the present study. The riddling session must be formally initiated, and the verb “give” (as seen in line 2 of the transcript) signals that the performance has commenced. Whilst there is no formal penalty for failing to provide the correct answer, an inability to solve a riddle can result in social embarrassment or light-hearted ridicule. Ultimately, an *entelah* is not composed overnight but is carefully assembled through the integration of multiple cognitive, pragmatic, and linguistic processes. This iterative and collaborative nature of riddle composition reflects the dynamic interplay between individual agency and collective cultural knowledge, ensuring that the tradition remains both rooted in ancestral wisdom and responsive to contemporary linguistic and social contexts.

### ***The Cognitive and Pragmatic Mechanisms Underlying Language Ambiguity Within the Entelah***

According to Weiner (1997), folk riddles derive their characteristic ambiguity through deliberate violations of pragmatic rules that govern ordinary discourse. This form of ambiguity can be productively explored through three key concepts from pragmatics: salience, accessibility hierarchy, and parallelism. All three aspects are relevant to the analysis of *entelah*, as they can be linked to cognitive categories and features associated with specific domains of cultural knowledge acquisition. Given that culture fundamentally shapes and influences cognitive strategies, violations of the rules governing cognitive categories can be interpreted as another form of linguistic manipulation. Pragmatics therefore offers a valuable analytical lens for studying riddling language as both a cultural and linguistic phenomenon.

Salience refers to the prominence or psychological centrality of a particular feature with respect to a concept to which it does or could apply. An illustrative example is R5. When considering a common tropical seaside fruit such as the coconut, an individual is likely to foreground salient attributes such as its hard outer shell, fibrous husk, and association with coastal palm trees. R5, however, deliberately disregards these conventionally salient features in its construction of the riddle image, as shown below.

<b>No.</b>	<b>Iban</b>	<b>English</b>
R5	Bisi langit nadai bulan, bisi ai nadai ikan  Ulu lungga: Bah bubur Lalai: Buah nyiur	There's water without fish, sky without moon  Answer: Coconut

To solve the above riddle, it is necessary to exclude the most salient feature of the coconut (i.e. its hard shell) in order to arrive at the answer. This riddle functions effectively because the top of the fruit is typically sliced off to reveal a pool of clear water suitable for drinking, and the fruit is subsequently split open to expose the white flesh—described metaphorically in the riddle as “the open white sky.” Since neither the moon nor fish fit within the conceptual framework of a coconut, they automatically function as distractors, leading the solver away from the intended answer.

No.	Iban	English
R6	Lebuh mit mesai sumpit, Lebuh besai mesai terabai.  Ulu lungga: Manuk ibun mansang Lalai: Sumbuk daun pisang	When small like a blowpipe, When big like a shield.  Answer: Banana shoot
R7	Agi mit bekain udah besai telanjai  Ulu lungga: Kayu Lalai: Tubu	When I was an infant I was wrapped, when I grew up I was naked  Answer: Bamboo shoot

Another pragmatic process involving ad hoc categorisation and accessibility hierarchy can be observed in R6 (shared by an informant) and R7 (Tun Jugah Foundation, 2019). In these riddles, when one hears “big” and “small,” these terms are initially processed in relation to adjectival size distinctions. However, beyond this surface interpretation lies the phonetic correspondence between the end sound of the *ulu lungga* and the answer. Adjectives such as “small blowpipes” and “wrapped infants” can be assigned to ad hoc categories such as “ways of describing weakness, helplessness, or protection” and “youth as vulnerability versus toughness through exposure.” These categories can be understood as representing membership in Iban society for R6, and the transition from childhood to manhood for R7. The riddles are therefore not primarily concerned with graded taxonomic categories but rather with cultural values and foundational concepts embedded in Iban world knowledge.

No.	Iban	English
R8	Batang iya jabang, dan iya rungan  Ulu lungga: Manang Lalai: Senapang	The stem is cassava, the branch is papaya  Answer: Rifle
R9	Ada siku, digitang indunya, ada siku, digitang indunya  Ulu lungga: Alah baya Lalai: Buah nangka	Comes a baby, the mother hangs it, comes a baby, the mother hangs it  Answer: Jackfruit

Parallelism refers to a cognitive and linguistic tendency to anticipate parallel structures when presented with a list of two or more attributes. In R8, both “stem” and “branch” are attributes of a tree or plant, whilst “trunk” and “papaya” are food or plant resources. There is conceptual harmony

in the pairing of “trunk” and “stem,” but discord arises when “branch” is linked to “papaya,” thereby complicating interpretation. When the solver hears the end sound of the *ulu lungga* as -*ang*, a phonological realisation of the end rhyme /*sina:pa:ng*/ is anticipated. In R9, both mother and infant are positioned in a relationship of care—one who “gives” care and one who “needs” it. However, associating the mother with infanticide creates conceptual friction with reality, as this is not a common cultural category and requires specific environmental and contextual awareness. Pragmatically, these features help explain how *entelah* derives its characteristic ambiguity. A third dimension of parallelism can be observed in the rules of poetic structure. The Iban view riddling language as poetic prose (Sather, 2017), and the Saribas Iban recognise several varieties of end rhymes (e.g. *enteli main*), which they employ freely in their *leka main* performances.

No.	Iban	English
R10	Bejambul baka <b>China</b> , betisik baka naga  Ulu lungga: Alah panas Lalai: Buah nanas	Crested like a Chinese, scaly like a dragon  Answer: Pineapple
R11	Bujang <b>kurus</b> bagas majuh. Bujang <b>kerigai</b> bagas makai.  Ulu lungga: Manuk Lalai: Siduk	Skinny bachelor eats well. Bony bachelor eats well.  Answer: Spoon

R10 employs a dominant -*a* rhyme scheme (*enteli main = lebu bedaja*), indicated in bold. The phrases function as similes containing both nouns and adjectives. Whilst the connection between scales and snakes is complementary and semantically coherent, the pairing of crest and Chinese creates confusion. Similarly, R11’s use of “famished” and “bonny,” alongside “skinny bachelor,” presents observations along a similarity cline that requires deeper cognitive engagement. These examples provide evidence for how folk riddles derive their characteristic ambiguity. However, some folk riddles cannot be explained solely through salient features of an object’s identity or through reliance on formulaic phrases and words; instead, they must be examined in relation to linguistic ambiguity.

As noted by Pepicello and Green (1984), folk riddles can and often do contain evidence of both linguistic and metaphorical ambiguity. This view differs from Dienhart’s (1998) position, which emphasises that ambiguity is primarily related to phonologically similar forms. Whilst we agree with Dienhart that phonology plays a controlling role in riddle ambiguity, we also concur with Pepicello and Green’s broader framework. This section will therefore explore Dienhart’s linguistic analysis alongside Pepicello and Green’s conceptual approach.

No.	Iban	English
R12	Bansa lain ti ngempu, bansa kitai ti makai  Ulu lungga: Buah nyala Lalai: Rian belanda	Another race owns it, our race eats it  Answer: Sour sop

Dienhart (1998) argues that at the heart of linguistically ambiguous riddles lies a “semantic script-switch trigger,” wherein a portion of the riddle simultaneously refers to two unrelated semantic scripts or cognitive frames. In R12, the riddle image provides no immediate clues, making it particularly challenging for the riddle solver to produce an answer. The *ulu lungga*, however, functions as a trigger that prompts the solver to associate the answer with a possible fruit, ultimately leading to the answer *rian Belanda* (literally “Dutch durian,” referring to soursop). Depending on the performance context, the answer can be substituted with alternative fruits such as *limau Mandarin* (Mandarin orange) or *terung cina* (Chinese eggplant). Polysemy is evident here: the word *buah* represents both a collective noun and the specific term “fruit,” whilst *Belanda* can refer to a nationality (“Dutch”) or function as the verb “to run.” According to Dienhart (1998), the semantic script-switch operates in relation to the phonetic correspondence between the two scripts that the trigger links. This makes it possible for one end of the interpretative cline to contain the true identity of the referent, whilst the other end hosts the polysemous or metaphorical alternative. This principle is again applicable to R10 and R11. A clearer illustration can be found in the use of deep and shallow Iban (*jaku dalam* versus *jaku mabu*), as explained by Sather (2017) in relation to the healer’s seeing stone, which can be called either *batu ilau* or *batu karas* (translucent stone). Riddles R13–R16 provide further examples of polysemy at work.

No.	Iban	English
R13	<p><b>Riung dua riung</b>  Tumbuh di tanah matah langgung  Jereki enggau badi andung  Pun diibun pasun jelu remaung bekuyu  kembung  Ngibun ubat manang  Churing dua churing  Jereki enggau badi bari lembing  Asuh diibun pasun jelu tengiling  Ngeli juring nancham bekumbang</p> <p>Ulu lungga: Enturun  Lalai: Talipaun</p>	<p>Two stalks of riung (riverine flower) growing at the plain,  Fortune in big blade dagger protected by snarling tiger,  Guarding the healer’s medicine  Keeping the shaman’s medicine box  One stripe two stripes  Fortune and death guarded by sharp-teeth pangolin</p> <p>Answer: Telephone</p>

In R13, the trigger is the reduplicated form *ruing ruing*, which employs onomatopoeia to replicate both the sound of a telephone and the name of a riverine flower. In R12, *durian Belanda* (a Malay loanword) simultaneously represents “soursop” and exhibits homonymy with the verb “to run.” Two scripts are considered homonymous when they share the same phonetic and orthographic realisation but represent distinct lexemes. Pepicello and Green (1984) approach linguistic ambiguity in folk riddles through the lens of both linguistic and metaphorical ambiguity, including an exploration of the different linguistic processes (e.g. phonology, morphology, and syntax) that contribute to phonological similarity.

In R14 below, lexical ambiguity is demonstrated through: (a) the connection between two nouns, “stomach” and “eyes” (as in the switch and bulb of a torch), and (b) the metaphor of a blister that bursts (e.g. *picit ((perut)(mata)) melut*). Lexical ambiguity is, of course, a common feature of riddles worldwide, and given the cultural emphasis on deep and shallow Iban, this is to be expected. The other two forms of ambiguity, however, require more detailed analysis.

No.	Iban	English
R14	<p><u>Lexical ambiguity</u></p> <p>Pichit perut, mata melut</p> <p>Ulu lungga: Nemu mit Lalai: Lampu picit</p>	<p><u>Lexical ambiguity</u></p> <p>Press the <b>stomach eyes</b> protrude</p>
R15	<p><u>Word stress ambiguity</u></p> <p>Raja sengat ngema atap seribu</p> <p>Ulu lungga: Apuk Lalai: Manuk</p>	<p><u>Word stress ambiguity</u></p> <p>King of sting carries thousand thatches</p> <p>Answer: Chicken</p>
R16	<p><u>Word boundary ambiguity</u></p> <p><b>Luan</b> ditanya, kemudi nyaut</p> <p>Ulu lungga: Yuk Lalai: Uduk</p>	<p><u>Word boundary ambiguity</u></p> <p>Front is asked, back answers</p> <p>Answer: Dog</p>

The *entelah* manipulates word stress ambiguity in R15 by placing emphasis on *raja sengat ngema* and *raja sengat*, where stress on *ngema* can imply either a question (e.g. “The king of Y is able to carry X?”) or a statement. Alternatively, it can also invoke *ngema atap*, which functions as a collective noun meaning “attap roof” or “a roof with a thousand thatches.” As for R16, the noun *luan* (front) can be transformed from a noun to a verb by adding the prefix *nge-* to form *ngeluan*, meaning “to prioritise.” When the riddle referent in R16 is articulated with the prefix spoken rapidly, it becomes easy to understand how ambiguity arises, as the meaning can shift to “prioritise the question, and the answer will emerge.

## CONCLUSION

This study demonstrates that folk riddling is both a cultural and linguistic act that operates not only in relation to world knowledge but also through processes of semantic association and semantic priming—dimensions often overlooked by local researchers. Whilst folk riddles possess a discernible linguistic framework, riddle givers purposefully produce semantically and syntactically unclear statements, rendering systematic analysis inherently challenging. Consequently, ambiguity must be understood as taking two forms: linguistic and contextual (metaphorical). Although both forms involve the manipulation of language and meaning, linguistic ambiguity is particularly significant for demonstrating that folk riddling functions primarily as a linguistic act rather than solely as a cultural one. As such, a psycholinguistic study of linguistic ambiguity, such as the one presented here, is valuable for several reasons. The study can be

expanded to deepen our understanding of ambiguity and manipulative language use more broadly. The ability to detect and resolve ambiguity constitutes a crucial component of communicative competence. Research examining ambiguity in riddle knowledge contributes directly to the development of linguistic competence. Adults are known to detect and resolve lexical ambiguities more rapidly than surface-structure ambiguities, which, in turn, are processed more quickly than deep-structure ambiguities (MacKay, 1966; MacKay & Bever, 1967). An adequate understanding of children's developing ability to appreciate jokes and riddles therefore requires deep insights into the various stages through which children acquire the capacity to detect linguistic ambiguity.

The ability to detect linguistic ambiguity develops at different rates across individuals, and the detection of syntactic ambiguity is not readily evident in children's riddles. The relatively late development in the ability to detect syntactic ambiguity observed in the present study suggests that syntactic ambiguity may not be accorded sufficient importance in Iban riddle knowledge. This finding may be related to the fact that the concept of "wit" is a culturally loaded term within a hierarchy-based system and does not necessarily align with the values embedded in Western riddling contexts. In light of earlier assumptions regarding the relationship between developmental rate and ease of interpretative processing, the fact that detection of surface-structure and deep-structure ambiguities appears indistinguishable at every developmental level is inconsistent with previous findings in the psycholinguistic literature. This suggests that surface-structure cues are not readily employed by Iban riddle solvers. Furthermore, the fact that the riddles in this study were recorded in a flat, even intonation pattern may have further limited interpretative possibilities, thereby obscuring the role of prosodic and paralinguistic cues in ambiguity resolution.

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### FOOTNOTES

<sup>1</sup> The cultural value of vulnerability and protection is operationalised through riddle imagery that contrasts physical smallness with states of dependence or care. In R6 and R7, descriptors associated with size are interpreted as symbolic representations of social conditions such as youth, exposure, and the need for protection, reflecting culturally embedded understandings within Iban world knowledge.

<sup>2</sup> The ambiguity characteristic of *entelah* is operationalised as a pragmatic effect arising from tension between culturally familiar schemas. Meaning is not resolved through literal interpretation but through the reconciliation of phonological cues, contextual inference, and culturally embedded world knowledge.

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## Disability, Identity and Impact of Impairments on The Survivors of Road Traffic Injuries (RTIs)

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### ABSTRACT

*This paper examines the direct and vicarious impact of impairments on the lives of survivors of road traffic injuries (RTIs) and their families. Although the focus of analysis is at individual and household levels, in discussion it relates to social structures. Drawing on data from in-depth interviews and participant observation among survivors, caregivers and community leaders, this paper aims to provide a deeper understanding of disability and to critique ideas linked to lay aetiologies of RTIs, such as fate and individual irresponsibility. Before injury, survivors were living without disability and actively participating in their social world. The paper shows that after injury, survivors social and economic lives were altered, as they coped with changes in bodily functions, and physical capability, and in consequence, as they faced limited opportunities to engage in the social world. It investigates how types of disability affect people in different ways, in an effort to understand the links between their varied experiences, age, gender and ethnicity.*

*Keywords: road traffic injuries; impact; disability; identity; coping*

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### INTRODUCTION

This paper documents the impact of RTIs on survivors and their family members including survivors' experiences of living with altered bodily functions and gender roles. It informs by many philosophical frameworks including symbolic interactionism (Mead, 1934; Blumer, 1962); the phenomenological insights of Merleau-Ponty (1962, 2002); and constructionism (Turner, 1992; Shilling, 1993, 2003). In other words, these theoretical perspectives influenced a range of aspects such as how the fieldwork was conducted in the study setting (i.e. Kuching and Kota Samarahan) and the analysis of data. Participants' diverse background such as the types of injury, age, gender, ethnicity, and education level contributed to deeper understanding of their experiences living with disability in developing country—Malaysia.

The paper focuses on survivors living with spinal cord injury (SCI), amputees and people with limbs paralysis. These survivors were important in part because before the injury they were able-bodied<sup>1</sup> but following RTIs they face dramatic loss of body functions. Furthermore, by concentrating on people with ‘visible’ disability the paper tries to tease out the complexity surround injured bodies such as the impact of disability on identity and living with limited financial support.

## RESEARCH METHODS

This study used qualitative research methods such as participant observation and in-depth interviews as the main methods of data collection. Ethics clearance was granted by Monash University Human Research Ethics Committee (MUHREC) and research permit was granted by the Economic Planning Unit, Putrajaya and the State Planning Unit, Kuching. Participation in the study was voluntarily and prior consent forms were obtained from participants. Although the interviews were planned to take 60-90 minutes but during the actual interviews, breaks took place based on the needs of participants.

The analysis of data for the research involved several steps – classification of administrative data, statistics and newspaper discourses according to categories; organization of raw data according to groups such as the field notes, note expansions and audio-recorded interviews; and transcription of the audio-recorded interviews. As discussed by Hansen (2020), data collection and data analysis are often performed concurrently in qualitative research. Concurrent data collection and analysis was useful because it helped to identify the strengths and weakness of the research methods, assisted in addressing research weakness, and contribute in decision making and justification whether data collected were enough. Triangulation in data analysis—content analysis and thematic analysis was used. The combination of analytic approaches allowed researchers to draw the best from each approach and to develop a fuller, more complex picture of the phenomena investigated (Hansen, 2020). Triangulation in data analysis included comparing the data from participant observations with the data from interviews. Following Hansen (2020), in content analysis, the author emphasized the usage of words and phrases and this enabled her to focus on what was commonly mentioned by participants in dealing with their social world.

Analysing text involved several tasks such as “discovering themes and subthemes, winnowing themes to a manageable few (i.e. deciding which themes are important in a particular project), building hierarchies of themes or a code book, and linking themes into theoretical models” (Ryan & Bernard, 2003: 85). Thematic analysis is used to identify themes emerging from the data. Coding techniques were used to assist in identifying significant sections in the data. During coding sections in the data were identified, coded (marked) and then sorted into groups of like and unlike, main and subsidiary themes (Hansen, 2020). Microsoft Excel was used to summarize the participants’ demographic backgrounds in terms of their age, sex, ethnicity, religion and education and data were interpreted. The majority of the participants were male: both the survivors and community leaders were male. In terms of ethnicity the majority of the survivors were Malay, reflecting that Malays were more likely to register with relevant government agencies partly because many lived in Kuching and Kota Samarahan. The majority of the participants were married and had received formal education (refer Tables 1, 2 and 3).

TABLE 1: *Demographic profile of survivors*

	Age	Years living with disability	Ethnicity	Religion	Educational level	Marital status at the time of		Occupation at the time of	
						Injury	Interview	Injury	Interview
Jalil	29	4	Malay	Islam	Primary 6	Married	Married	Sawmill worker	Unemployed
Alam	28	4	Malay	Islam	Primary 6	Single	Single	Factory worker	Unemployed
Junid	31	4	Malay	Islam	Secondary (Form 5)	Single	Single	Technician	Self-employed
Balan	51	28	Bidayuh	Christianity	Secondary (Form 5)	Single	Single	Trainee teacher	Unemployed
Jawan	35	10	Iban	Christianity	Secondary (Form 5)	Married	Divorced	Technician	Self-employed
Limah	26	11	Malay	Islam	Secondary (Form 3)	Single	Single	Student	Office assistant
Duat	32	18	Iban	Christianity	Secondary (Form 2)	Single	Single	Student	Delivery assistant
Adli	30	7	Malay	Islam	Primary 6	Single	Single	Labourer	Unemployed
Safri	26	9	Malay	Islam	Secondary (Form 2)	Single	Single	Construction worker	Waiter
Bolhan	41	2	Malay	Islam	Secondary (Form 1)	Married	Married	General worker	Security staff
Halim	46	19	Malay	Islam	Secondary (Form 5)	Single	Married	Plumber	Shop assistant
Sitam	56	7	Iban	Christianity	Secondary (Form 5)	Married	Married	General worker	Security staff
Uwai	47	9	Iban	Christianity	Secondary (Form 2)	Married	Married	Assistant driver	Security staff
Diman	19	1.5	Bidayuh	Christianity	Secondary (Form 5)	Single	Single	Student	Unemployed
Liman	42	8	Bidayuh	Christianity	Secondary (Form 5)	Married	Divorced	Lab Assistant	Office assistant

TABLE 2: Demographic profile of carers

	Gender	Age	Cared for	Ethnicity	Religion	Educational level
Bibi	Female	28	Husband	Malay	Islam	Primary (completed)
Aminah	Female	70	Son	Malay	Islam	No formal education
Kamal	Male	63	Son	Malay	Islam	Secondary (Form Three)
Nur	Female	50	Son	Malay	Islam	Primary (not completed)
Dewi	Female	39	Brother	Malay	Islam	Primary (not completed)
Dayang	Female	55	Son	Malay	Islam	No formal education
Siti	Female	34	Husband	Bidayuh	Islam	Primary (not completed)
Diana	Female	38	Husband	Malay	Islam	Primary (not completed)
Annie	Female	42	Son	Bidayuh	Christianity	Secondary (Form Three)

TABLE 3: Demographic profile of community leaders

	Gender	Age	Ethnicity	Religion	Educational level
Rantai	Male	56	Iban	Christianity	Secondary
Bundak	Male	55	Iban	Christianity	Secondary
Rentap	Male	64	Iban	Christianity	Secondary
Sukeri	Male	52	Malay	Islam	Primary
Ahmad	Male	69	Malay	Islam	Primary
Dollah	Male	64	Malay	Islam	No formal education
Rahman	Male	69	Malay	Islam	No formal education
Maliki	Male	64	Malay	Islam	Primary
Tahir	Male	53	Malay	Islam	Primary
Badrul	Male	65	Malay	Islam	Primary
Tinggi	Male	57	Iban	Christianity	Secondary
Chong	Male	54	Chinese	None	Primary
Mansor	Male	60	Malay	Islam	Primary
Begek	Male	74	Bidayuh	Christianity	Tertiary (diploma)
Jambu	Male	66	Bidayuh	Christianity	Secondary
Tamin	Male	71	Iban	Christianity	Tertiary
Hasnah	Female	61	Malay	Islam	Secondary
Karim	Male	63	Malay	Islam	Tertiary (diploma)
Badrul	Male	60	Malay	Islam	Tertiary (diploma)

In sum, we have demonstrated important aspects related to qualitative research and outlined how the research was conducted and why certain methods were chosen. We proceed with the findings of the study. Firstly, it considers how survivors were physically affected by traffic accidents, and how this impacted on attitudes and emotions, capacity to work and employment, and their social lives.

## FINDINGS

### *Altered bodily functions*

All “born perfect” (*dilahirkan sempurna*) survivors experienced loss of bodily functions due to injuries, and this led to restrictions in their participation in both domestic and public spheres. People who survived SCI experienced a profound impact on function, and became dependent on their families for survival. Survivors of SCI and people who have undergone amputation have to learn to live with “visible ruptures” as they attempt to gain at least some autonomy (Manderson, 2011: 93). Papadimitriou (2008: 293) states that wheelchair users have to undergo a “process of re-embodiment” – what Manderson (2011) refers to as ‘rehabilitation’ – to come to terms with their disability; this process requires survivors to “redefine, re-examine or modify past experiences, abilities, lifestyles and habits” (Papadimitriou, 2008: 293). Several survivors in this study needed to incorporate technology (for example, wheelchairs, prostheses) into their body schema to facilitate mobility and independence. In this context, therefore, physically as well as psychologically, these survivors had to rework their identity after injuries.

Balan lost all physical capability from the neck down; as a result, he was ‘totally dependent’ on others for personal hygiene, feeding and his very survival. Others were ‘partially dependent’ on family members for daily activities, all of which they had performed without help before injury. Adli was able move around in a wheelchair and feed himself, but he was dependent on family members for other day-to-day needs, including cooking and laundry. Similarly, Junid was able to use his wheelchair inside his house but was ‘partially dependent’ on his family to go outside his home: “In the past, I was free. Now, I am restricted. I depend on my parents and a brother to be able to move around in my wheelchair in most places.”

The desire and determination of survivors to be independent was partly thwarted by social and built environmental structures, such as access to public spaces and amenities. Jawan experienced barriers to his participation outside his home. His view about disability was in line with a ‘social model’: “Restricted outdoor activities occur for several reasons: no personal vehicle, public transport, such as bus and taxi services, not user-friendly, the majority of shops near housing areas not wheelchair-friendly.”

The lives of survivors with less severe impairments, most with leg injuries, were also affected. Although three people were mobile with or without assistive devices, they spoke of walking more slowly and experienced mobility within and beyond their place of residence. Limah explained that she could not ride her motorcycle anymore and “moving around is slower.” Diman’s freedom to move around was also disrupted:

I cannot go anywhere I like. It was so difficult for me to sit for my examination last year because it was difficult to go to the examination [on crutches]. I feel very sad. I feel sorry for myself, sad, frustrated because I cannot go anywhere. My legs are sad.

Diman's impairment and resultant disability affected him both emotionally and physically, and this was partly shaped by his interactions with his social world. Diman, 19 years old, knew that his injury placed him at a disadvantage with respect to securing a full-time job, establishing a career, and finding a life partner (see Henslin, 2007; Papic et. al, 2022).

People who had experienced injuries to their hands had trouble lifting heavy things and performing hard work. Hassan lost his job as a fieldworker with a surveying company after his injury, and had to look for work that did not require physical strength: "I cannot lift heavy things. Now I work as a security worker in a supermarket." Duat had to learn how to cope with his injured hand, and this took time: "Working is difficult: doing hard work and lifting stuff after the tragedy. I can't do more of it now." Although both these men were working at the time of their interviews, they received lower salaries than they had pre-accident and they had low job status. Limah and Halim, who also had injuries to their hands, experienced similar predicaments: reduced income and lower job status.

### ***Psychological impact: attitudes and emotions***

Although disability affected the lives of survivors negatively, a few survivors perceived that their injuries had transformed their lives in a positive way. Those who claimed their attitudes had changed positively portrayed creative ways of managing their disability; for example, they explained that they had become more patient and were better able to control their feelings and emotions:

In terms of attitude, I am OK after I became disabled. Maybe I have changed a hundred per cent, to be a new person. I have learnt to be patient. (Jawan)

I felt angry when my friends were teasing me, but I have to be patient. I took my desires elsewhere. The urge to see my friends is there, but I control my feelings. (Diman)

The emotional impact of disability was associated with feelings of sadness, sorrow, bitterness, discomfort and shame. These emotions are examples of the 'indirect costs' of disability, which cannot be quantified (WHO & World Bank, 2011). All participants who sustained injuries articulated that the resultant disability had affected them emotionally. However, the most significant impact was experienced by those who faced severe changes, leading to deeply 'discrediting identity' in Goffman's (1963) terms. For instance, Jawan, who survived SCI, said that he experienced "trauma, stress and depression for six years" and Adli, who lost both his legs, explained that the "effect of the accident is very bitter. It is very hard for me to face."

Diman was working on managing a discrepancy between 'self-identity' and 'social identity' (Leavey & Kelleher, 2004), a difficult task for any newly disabled person. At the time of his injury, he had had a physically active life and was a "happy-go-lucky" person. When the interview was conducted, he was a young adult and had become more mature; he reflected on "being childish," crying during his initial hospitalization.

Balan was grappling with social and psychological issues: he was quadriplegic and his dream of a career in teaching was shattered by the injury. His desire to engage in the social world failed

to materialize for various reasons, including dependence for personal care and few opportunities to engage in leisure activities. He continued to feel “tormented:”

It is very sad. Sometimes I also feel quite upset because I know I want do things but I can't. My mind and my desire are to experience such things, but I can't. So psychologically, it hurts; it is torturing me because I know I could do many things before injury. Now I can't use my hands, my ability is limited.

Goffman (1963) states that stigma or ‘spoiled identity’ discredits a person’s claim to a ‘normal’ identity, producing many negative effects, including despair and shame. Consistent with this, several survivors felt sadness and shame simultaneously, in response to others’ negative attitudes and excluding behaviour; they felt the pressure or urge to participate in society and interact with others, yet were unable to do so. For example, Uwai said he felt sorry for himself because he wanted “to participate in what people do,” but he could not. Diman’s disability became the subject of teasing by his former schoolmates and classmates, and he recounted that he felt “very sad and ashamed.” Similarly, Uwai felt that he was an object of fun for others because he limped and he had to walk slower than others: “I feel embarrassed. If I walk, I am not balanced. When other persons are getting out of a car, I am still sitting, trying to get up so slowly. I cannot take a bus at all.”

Sad and uncomfortable feelings were also associated with survivors’ inability to contribute to household incomes. In Bidayuh, Iban and Malay cultures, men are expected to give money to their parents as a way of contributing to the household and as a form of appreciation for raising them. Before injury, Safri regularly gave cash to his mother and bought food items for the household. Now Safri’s family wanted him “to save the money,” to be used in the future, for example, to cover costs of transport to go to medical centre, to cover the costs of future medical care, and to pay for a new prosthetic leg when required. But Safri was self-conscious of this change in expectation: “Since the injury, I can’t help my family financially, and this makes me sad. I am sad. They don’t expect a contribution from me. They don’t want to receive my money. They want me to save the money I earned. I feel uncomfortable.”

### ***Education and employment***

Prior to injury, four participants – Balan, Limah, Duat and Diman – were pursuing formal education: Balan was in college studying for a diploma; Limah, Duat and Diman were in secondary school. After injury, Balan, Limah and Duat all stopped studying. Diman experienced difficulties in continuing his education because his injury occurred several months before the public examination, the Malaysia Certificate of Education. He missed classes and had limited time for study because he needed medical treatment and rehabilitation. His examination results were disappointing, leading him to imagine his future as one of uncertainty: “I see my future as bleak because I have a disability and my leg is impaired.”

A growing body of research illustrates the interplay between disability and poverty (WHO & World Bank, 2011) and this study demonstrates this link. As Jawan reiterated, “most persons with spinal cord injury are poor.” The majority of wheelchair users with SCI or amputations, living in Kuching, were grappling with barriers to access and opportunities, including lack of financial

support and few job opportunities, given their lack of physical strength expected of manual workers.

In Malaysia people with disabilities usually occupy low status jobs and earn less income than non-disabled people (Department of Statistics, 2019). Similarly, ten survivors of RTIs in this study who returned to work after injury experienced changes in terms of the nature of their work and the place where they worked, and as a result, they earned significantly less income than they had previously. Safri explained that, in the past, he had earned each month “approximately 900 Ringgit” [US\$300], but at the time of the study he received “around 350 Ringgit” [US\$117] per month. Similarly, Uwai was concerned about finance:

About money, about money to pay for many things, I am desperately seeking extra money. Before I became disabled, I could pay for stuff I needed. After injury, I worked as a security worker at someone’s house for little pay. Then, my salary was increased. I cannot walk around too long. I sit during working hours.

The majority of survivors had quit their jobs after injury, and their unemployment affected their social status and their capacity to meet their daily needs. According to Oh (2021), it is difficult for those who lack a regular income to live in any society where people perceive spending power as equating with social status. Adli explained that it was difficult for him “to buy medicine and stuff” that he needed because he was not working. Jalil and his family lacked money to buy even basic food items: “After the accident, it’s so hard. Working is hard. Looking for money is hard.”

### *Altered gender roles*

Gender roles may be defined as “socially shaped and shared expectations about which activities, attributes, behaviours and spheres of action are suited for men and women” (Matthewman, West-Newman, & Curtis, 2007: 433). Survivors’ experiences of living with impairments and disability had shaped their views on their gender roles, identity and wellbeing.

In Malay, Iban and Bidayuh cultures, women perform the majority of household chores, although this includes physically demanding work like fetching firewood and water; men carry out most paid and unpaid work outside the home. In this study, five men were staying at home after they became disabled, which impacted their roles as breadwinners and their self-image as men, for example, being independent. Alam recounted that in the past, he “hardly [ever] stayed at home” due to work commitments, but after injury he was “always at home.” Jalil explained that his spirit to work was still alive, but his injury restricted his activities: “If possible, I want to work independently. For example, I plant flowers and chillies, I do light work. I feel the impact is obvious. However, my spirit is there. My spirit, work spirit is there, but it is a bit difficult now.”

As already acknowledged men are expected to provide income for their households whether they are working near home or further away. Duat said that after he received his salary, he sent money to his mother and this made her happy. She was dependent on him and he spoke of feeling obligated to help her. Despite receiving a small wage each month after his injury, Duat continued to play the role of a ‘good’ son by being thrifty and postponing his plan to buy a car until he had enough savings. At the time of the study, although he had lost one hand, he spent his weekends sourcing food by collecting jungle produce and fishing.

Several married survivors faced difficulties in being able to work, and their wives had to work outside the home to provide for the family. Uwai's income from being a security guard was not sufficient to support his family, and as a result, his wife had to work "extra hours to earn extra income" for the family and to pay for most of the things they needed.

The prevailing cultural images of men as independent contrasted sharply with the experiences of survivors who were dependent on families or formal carers. For example, Balan had to negotiate his identity as he was "totally dependent" on male care workers for his day-to-day needs: "I see that I have become a new person because all the things I could do before, I cannot do now. I am very dependent on others. I am totally dependent on male staff."

Some survivors were also affected because of the difficulties of doing things that they had taken for granted prior to injury. For instance, Jawan referred to "so many obstacles in our daily lives," including social interactions and leisure activities. As Limah had no washing machine, she spoke of the practical difficulties that arose when washing clothes with her hands; this task placed tremendous pressure on her time and energy.

### ***Effects on relationships***

Disability influenced the lives of survivors who were married before injury, whether the marriages ended or remained intact. Both Liman and Jawan divorced two and five years after their injuries respectively, for a range of reasons including financial difficulties and arguments about money. Subsequently, living alone, they experienced great loneliness, as Jawan explained: he was a "lonely aging man – time runs so slowly and [life] is full of boredom." Liman recounted times of sickness as his most dreaded moments. In contrast, married survivors claimed that disability had not changed the relationship between themselves and their wives, and most survivors' marriages continued after injury. Both Hassan and Jalil explained that their relationships with their wives remained unchanged, and their wives spoke of their love for their spouse as the glue of their marriage. In Bibi's (Jalil's wife's) words, "love" (*sayang*) had influenced her to ignore peoples' suggestions that she leave her husband because of his severe disability.

Disabled people's relationships with their families included face-to-face interactions and long-distant relationships, mediated by visits, phone calls and short messages. After injury, family relationships were experienced in various ways, therefore: as unchanged, negatively altered or reconfigures, or closer. A few survivors perceived that disability had not changed the relationships between themselves and their families or relatives. Uwai explained that his relationship with his family members, close friends and fellow villagers "remained good after the accident" and Duat maintained a "good relationship" with his family by returning to his village as often as he could after he became disabled. Others viewed family relationships as altered. For example, Junid's relationships with his siblings had changed after injury, as a result of their attitudes and actions toward him: "They have become cold. Maybe, maybe, they are a bit reluctant to help me." Junid's tone was low and he looked uncomfortable when he recounted his experiences dealing with his siblings.

A few survivors recounted that their family relationships had strengthened after injury. Limah's experience of living with a disability contributed to a better relationship with her family:

“The relationship gets closer with family members. They love me more. I keep in touch with them via SMS, sometimes my brother calls. I always call home. Sometimes my sister calls me regarding my mother. My mother is not well now.” Limah explained that before her injury she was ‘naughty’ (*nakal*), for example, she ignored her parents’ advice and always rode her motorcycle very fast. Her family enjoyed each other’s company at home but she often missed family activities because she spent significant time outside home with her friends. Since her injury, Limah has spent most of her time at home and this has improved family relationships. Although she was working in Samarahan at the time of the interview, away from her parents, she perceived her relationship with others in the family to be closer and more meaningful than in the past.

Survivors’ friends included people they knew before injury, including classmates, schoolmates, teammates and co-workers. After injury, survivors described various situations: being friendless; having friendships unchanged; having more friends; and having fewer friends. A few survivors had no friends or romantic relationships after injury. This contradicts the idea that social bonds exist ‘naturally’ between people “based on shared location, kinship, occupation or interests” (Matthewman et al., 2007: 428). For example, Uwai explained that his friendships had ‘died’ after he acquired his impairment and resultant disability, and that his present social life revolved around his work, his family and his relatives: “After the accident, I have had no friends.” Uwai explained that both his impairment and his long working hours prevented him from mingling with his former soccer-enthusiast friends, and although occasionally he watched people playing soccer in his neighbourhood, he felt he was no longer part of the group.

Milligan and Neufeldt (2001) highlighted that people with disabilities are sexually disenfranchised by a society that inaccurately perceives them as ‘asexual beings’; as a result, they may be denied opportunities to establish meaningful relationships. In this study, no one who was single or divorced had established a special relationship with someone of the opposite sex, although a few never-married survivors spoke of their hope of having a partner or getting married so that their lives would not be lonely. For example, Duat said, “I hope to get married if someone will accept me,” but his expression implied that he believed that his impairment could jeopardize his chance for a romantic relationship. Adli confided that he had no hope of finding a romantic partner because of his impairment, but he spoke of his hope that Allah would provide him with a ‘beautiful woman’ (*bidadari*) when he died someday. Limah, the only female participant, felt that her impairment shaped people’s perceptions of her as being unable to be a ‘good’ wife or a competent mother, and that influenced her chance of having a family.

Alam described his interactions with his friends as being unaltered, partly because he was a shy person: “Before and after the accident, I’ve remained the same. I have few friends.” Alam viewed his friends as true friends because they continued the relationships with him via phone calls and short messages. Alam was comfortable with the use of technology (i.e. mobile phone) to interact with his friends, rather than interacting with them face-to-face; in this case, technology was a resource for social inclusion. All survivors except Balan used prepaid mobile phones to interact with other people, with the costs of using mobile phones relatively inexpensive for people in low-income groups.

In contrast with the general trend, a few survivors reported that their friends had increased in number after injury; these friends had positive attitudes towards people with disabilities and they were open-minded about relationships across gender:

[Smiling] Many male friends, I am comfortable befriending men because they don't talk so much, they are open-minded and they have similar attitudes to me. (Limah, female)

Many friends: roughly sixty persons. The relationship with family members and friends has remained unchanged. They view me as a normal person. (Safri, male)

Limah had friendships with both men and women, although she had more male than female friends, mostly people she knew prior to injury. She had been a member of her neighbourhood's motorcycle club and had been physically active in sports at her high school. After her injury, she established new relationships with people through her involvement in bowling training and competitions. Safri's friends comprised village friends, colleagues and teammates; the majority were male.

But most survivors lost friends after injury, including because of their geographical distance from friends and their lack of time and opportunity to engage in social activities. Balan's friends had declined drastically because he had limited chances to interact and "could no longer stay in the longhouse." When his hand was "OK," Hassan was involved in rowing and had "many friends," but his impairment and his work prevented him from participating in rowing and other social activities. Others explained:

Now, my friends are limited and there are only a few left. My friends are from the same village, who I meet almost every day. Before injury, I had many friends. I keep in touch with old friends via the internet, SMS and telephone. (Junid)

I have fewer friends since I became disabled. I socialize less frequently. I spend most of my time at home. I go out sometimes, but it is difficult to go out. No transport. Not like when I was 'normal.' I have one to two friends but we are not close. When I was 'normal', I had many friends. Friendship with disabled persons in the support group continues, but the relationship with them is not close. (Jawan)

### ***Impact on leisure or recreational activities***

Leisure activities refer to activities performed for pleasure. Based on data drawn from the interviews with survivors and carers, we established four categories of survivors' leisure activities: previous leisure activities abandoned; new leisure activities acquired; previous leisure activities modified; and previous leisure activities retained.

### ***Previous leisure activities abandoned***

A few survivors abandoned leisure activities after injury because the activities required mobility and physical fitness. For example, football requires people to run, jump and bend, and as a result, Junid, Uwai and Adli had to abandon this game. In the past, Junid was an avid soccer player and a fan of Chelsea Football Club. He used the football club banner to decorate a section of his shop.

Junid explained that sometimes he watched his favourite team playing football on television, but he felt upset because he could play football anymore.

Adli had also loved to play football and badminton, and again had to abandon his past activities:

If I compare myself prior to and after the accident, of course, in the past, I had power *lah*. I could do everything: I repaired the house, mixed cement, drove the van, drove a lorry [and] carried wood, but now it is all gone. Playing football and badminton were my hobbies. After the things [legs] were gone, everything went. Everything I am interested in has gone.

### ***New leisure activities acquired***

A couple of carers explained that while survivors had had to abandon previous leisure activities, they had found new opportunities and acquired new leisure activities suited to their new capabilities.

Before the accident, [Jalil] loved hunting, for example, hunting for birds during paddy planting season, fishing, and he was involved in many other things. Now he is restricted! He can plant chillies along the roadside. (Bibi)

[Adli's] hobby before the accident was catching fish. Now he always plays with his mobile phone, his form of entertainment. He cannot walk. (Aminah)

### ***Previous leisure activities modified***

A few survivors modified their leisure activities. Diman used to enjoy riding his motorcycle and occasionally listened to music. After injury, he became a keen pillion rider on his friend's motorcycle and listened to loud music more often. Diman's mother said:

When my husband and I go out, he [Diman] enjoys motorcycle riding with his friend. He has become the 'passenger' and his friend rides the motorcycle. He likes to listen to music. When he wakes up in the morning he switches on the loud speaker, song after song. Sometimes he goes to sleep too late – around one to two in the morning.

Safri, who before injury liked to fish on a boat on the river and swim in the stream, had modified his activities by sitting on a wooden platform constructed at the riverbank in his village, and he swam in a public swimming pool in Samarahan. Safri explained that the sound of birds and running water made him feel calm and happy. He also enjoyed the company of young children in his village while he was fishing, and he spoke of sharing his experiences and advising them on the importance of road safety.

### ***New activities acquired***

A few survivors acquired new hobbies after their injury. Liman spoke of his involvement in a catfish-rearing project sponsored by the Department of Agriculture, Sarawak, as his weekend activity. Liman's nephew was managing the project full-time; Liman played the role of advisor

and was involved in marketing catfish to fellow villagers and colleagues. Junid was also involved in aquaculture as a new leisure activity and a source of income:

[Junid] acquired new hobbies. Before the accident, he was ‘working harder’ than my other children. He sold items to his friends. After the accident, he ‘worked’ the hardest: he was involved in a fish-rearing project, he buys and sells items and he was involved in petty commerce, including sale of credit vouchers, mobile phones and mobile accessories. He can’t be involved in selling heavy items though; it is problematic for him because his movement is limited. (Kamal)

Kamal perceived his son’s involvement in leisure activities as a form of work because of the time and energy Junid gave to these activities. Kamal held the view that there was no division between work and ‘hobbies’ after injury, because all activities required Junid’s commitment and the commitment of his family assistants.

### *Impact on identity*

A ‘medical model of disability’ locates disability within a person’s mind or body, and equates disability with ideas such as abnormality, pathology and disease (Nettleton, 2006). How survivors understood disability and its effect on identity varies however. Despite living with different types of physical disability, five survivors perceived their identity as normal. They rejected the relevance of impairments in the construction of their identity, and their impairments did not shape their views about their identity (Watson, 2002). Alam viewed himself as “OK, normal” before and after injury. Duat perceived his identity was ‘normal’ after he came to terms with his disability: “Now is normal. I have accepted it. Normal, normal! I don’t think I am disabled anymore.”

Seven survivors perceived that their disability had significantly changed their views about themselves, and they described their identity as “disabled.” They also acknowledged that their experiences of living with a disability were complicated due to various factors, including their acceptance of labels imposed on them based on physical differences and their inability to do activities that they had been able to do prior to injury. In other words, in Goffman’s (1963) terms, a ‘spoiled identity’ was used to differentiate people with a disability from able-bodied people. For example, Jalil did many things without difficulty prior to injury, but he now felt “inadequate”; Uwai said he had “become disabled, cannot walk steadily. In the past, I was normal, now, disabled.”

Three survivors perceived that their identity included both disabled and normal elements. They reiterated that their brains were normal but their bodily functions were altered. Survivors’ views were forms of resistance against ‘the medical model.’ For instance, Balan said: “I am paralysed. I cannot use my legs, I cannot use my arms. I still have my mind. My mind is still normal.”

PHOTO 1 highlights Diman’s perception of himself, visually, after he became disabled. Diman explained that he depicted that his head was bigger than the rest of his body because his “mind is sound” and his capability to think is similar that of able-bodied people. He reiterated that all his body was ‘normal’ except for his leg: “My disability is different because I can still think: my mind is sound. All my body is normal except my leg.”



PHOTO 1: *Diman's drawing of himself after injury*

The social world also shaped the views of survivors about their identity and about ability and inability. When Limah compared herself with people with a severe physical disability, she considered herself normal, because she was independent and able to perform most of her daily activities. However, when she faced difficulty performing some activities, for example, washing clothes, she viewed herself as disabled. She added, “Persons with wheelchairs cannot ride buses. Normal people like me can take bus rides.”

Families and friends varied too according to whether they viewed survivors as disabled or normal. Perceptions of identity in these contexts implied that significant others subscribed to the belief that two segments of the population inhabited their social world: disabled people and non-disabled people. Photo 2 and 3 support the idea of this stark binary classification of identity: disabled and non-disabled. This binary model of understanding identity contrasted with disabled participants' perceptions of more than two categories. The figures also reflect that physical difference were underpinned by multiple factors. Wheelchairs, for instance, were seen as symbols of restriction and stigma rather than of independence.



PHOTO 2: *Engaging in different activities; photo by the author*



PHOTO 3: *Living in two separate worlds; photo by the author*

The majority of significant others (i.e. carers and friends) perceived survivors' identity to be associated with negative attributes, for example, by the use of words or phrases with negative connotations such as 'lacking', 'not normal' and 'lack of freedom.' Several factors influenced these views including survivors' dependency on families for daily needs, their restricted mobility, inability to participate in high status economic activities, and being physically less active. These views reinforced the belief that disabled people were different from non-disabled people and that these negative attitudes could contribute to negative psychosocial consequences for survivors. Annie and Bibi, both carers, said:

He [Diman] is lacking. Not normal like other kids. He is like a bird with broken wings.  
He may be able to fly but he is not as active as before. (Annie)

I feel sad to see him [Jalil]. In the past we were free but now we are restricted. If we want to go to other places far from home, we cannot. Before, he had freedom such as when he went to work. Now he is always at home. So sad! (Bibi)

People who cared for survivors with the least severe injuries perceived the survivors' identity as normal, and explained that the impairment did not alter their views of the survivors' identity. Perceptions of survivors' identity were partly influenced by the engagement of survivors in economic activities after recovery and their ability to participate in social interactions, particularly at the workplace. Siti described her husband as normal, because "he is able to work" and Diana perceived her husband as "like other people." Their views implied that working and in other ways participating in social life, at a community level as well as at a household level, were among the most significant preconditions for being labelled as normal persons.

Significant others' views of survivors' identity as normal were also influenced by their perceptions of survivors' psychosocial wellbeing after injury. For example, Kamal and his family observed that Junid's behaviour and his identity changed as time went by. When the interview was conducted, Kamal said that Junid had shown tremendous improvement in terms of coping with his disability:

A few months after the accident he had changed, of course, at first he changed. Sometimes he was dreaming and we felt sad looking at him. He was upset after the accident. He also did not know what had happened to him. Now, he is normal, OK. He goes to work. There are changes in terms of his movement, very slow. At first, he could not stand up, now he can 'stand up' on his wheelchair. We hope he has better sensation. He has a little sensation in his legs now. (Kamal)

There were differences between survivors' and significant others' (i.e. carers' or friends') views of survivors' identity post injuries (see Table 4). This comparison is important because what a survivor experiences is unlikely to be experienced by carers or friends. Survivors' and significant others' views were the basis of understanding identity from two different worldviews. One group of participants had similar views about survivors' identity: survivors with severe injuries (e.g. Jalil, Jawan, Adli and Uwai) perceived they were disabled and their carers or friends had similar views about them. However, other survivors and their carers had contradictory views about identity. This suggests that survivors' and carers' views were shaped by many factors, including their experiences, language usage, gender, age and types of impairment (see Holmes, 2010). For example, although Alam perceived he was normal, his mother perceived he was disabled because he was totally dependent on her for his survival. Other participants had mixed views. Balan and Diman both viewed their identity as having elements of both disabled and normal identities, and reiterated that their minds were normal although some parts of their body were disabled.

TABLE 4: *Comparison of views about survivors' identity*

	Survivor's view	Carer's or family member's view	Friend's view	Comparison of views
Jalil	Disabled	Disabled		Similar
Jawan	Disabled		Disabled	Similar
Adli	Disabled	Disabled		Similar
Safri	Normal		Normal	Similar
Duat	Normal		Normal	Similar
Sitam	Normal	Normal		Similar
Uwai	Disabled	Disabled		Similar
Alam	Normal	Disabled		Contradictory
Liman	Normal	Disabled		Contradictory
Junid	Disabled	Normal		Contradictory
Bolhan	Disabled	Normal		Contradictory
Halim	Disabled	Normal		Contradictory
Balan	Normal & disabled	Disabled		Mixed
Diman	Normal & disabled	Disabled		Mixed
Limah	Normal & disabled		Normal	Mixed

### ***Psychological impact on children***

Lack of understanding of disability and negative attitudes among members of the community affected not only survivors and their primary carers, but also other family members, as demonstrated in Bibi's family. Bibi's son was being teased by a few of his schoolmates because his father had a disability, but he subscribed to the belief that men are not supposed to cry in front of other persons. Although being female is usually associated with sensitivity, Bibi's daughter also felt unable to cry in front of 'bullies.' Bibi's children used "varied and creative ways to resist and actively counter the negative effects of stigma" of living with a disabled parent (Green, Davis, Karshmer, Marsh, & Straight, 2005: 197). Bibi explained:

Sometimes other children tease my children because their father is disabled. One time, some children said, "How come other fathers can walk but your father can't walk?" Although my son was upset about the teasing, he kept quiet and didn't cry. When the weather is fine, we go around with the motorcycle. My children like having a ride. Other girls from the same neighbourhood also teased my daughter, and she told me about her experiences.

Bibi's husband's injury was the result of a motorcycle collision with a car. Although the traffic accident initially caused Bibi to suffer a phobia of using a motorcycle, her fear slowly eroded as time passed, and she perceived their motorcycle as a resource for inclusion, giving them freedom to move around their neighbourhood.

Halim's daughters aged sixteen and eight years old, never invited their school friends to their home, partly because they were ashamed of their dilapidated house and of being poor. However, a few of their friends from the same village were invited to their home during the festive

season (i.e. Eid Festival) because they felt that these friends understood their situation. I suggest Halim's children's strategy was creative: they knew their classmates and schoolmates came from different geographical settings and socio-economic status, and some of these students had negative attitudes towards people with disabilities and poor people.

### ***Financial hardship***

Other household members also faced financial difficulties. For instance, Diman and his mother (Annie) explained that their family had been in bad financial shape since Diman's injury, because the breadwinner (Diman's father) was frequently on leave from work to take Diman for medical treatment:

My family's financial standing is badly affected. My father is a truck driver. I go to the hospital so often and my father has to take leave to take and collect me. He gets a lot less money now. So terrible! Luckily, relatives top up some money to reduce the financial burden. (Diman)

We have had financial problems, especially when Diman was initially injured, because his father didn't go to work. We used up our savings to repair the motorcycle, to buy petrol, to cover my children's school expenses. I also didn't cook [lunch]. [Diman's] siblings had to eat instant noodles. Our financial status is bad. Going to other places is difficult. (Annie)

The impact of injury on Dewi's family was also significant because of the large household, and the need of household members to support Dewi's sister who was living separately.<sup>2</sup> Their financial difficulty was exacerbated because Dewi's husband was often ill, and the care-recipient (Adli) received very little financial support from the government. Dewi said sadly:

My life is hard. I have many children, but I don't contribute to help my mother financially. My older sister doesn't understand our circumstances because she still asks our mother for money. Therefore, my brother [Adli] is very upset with his sister and the other siblings. He doesn't like his elder sister. Adli observes my family situation. Although I'm angry with him, I'm sympathetic to him. He has no other siblings who are willing to share his burden. Although I scold him, he remains with me because I feed him. I cannot stand feeling sad when I hear, "I have no money. I haven't eaten chicken for ages." (Crying) Now he's all right. If he dies one day, I can't replace him. When he was 'normal,' he didn't give money to me. Now, he always asks me for money. I have many burdens. I have children who are still at school. I care for my mother and I care for him. I have no more savings. I live a very simple life now. If I'm sick, I leave it to God. I have shared my difficulties with a few government workers, but they just kept quiet. As long as I am able to work, I work to assist my husband to feed my family. We will just eat whatever we have, eat porridge with salt.

Dewi's experience reflected the 'double life' of the family – the family was a source of conflict and dissatisfaction as well as support (Matthewman et al., 2007). At the time of the interview, the cost of living in Kuching and Samarahan was high. Chicken cost between RM7-8 (US\$2.3 to US\$2.7) per kilogram, and beef was RM35 (US\$11.7) per kilogram. Bibi's experience was an

example of how financial difficulties affected her family. She perceived chicken as a ‘luxury’ food item; her reference to “eating porridge with salt” suggests a minimal diet.

In addition, after injury, the lives of members of several families were affected because of arguments and lack of time for a break or vacation. Annie lamented that “family relationships are stressful” and plans for a holiday were cancelled:

Sometimes I argue with my husband. I also argue with my son because he is too lazy to exercise. The most significant effect is that we cannot return to the village for Christmas. We cannot enjoy life as this family is in a state of sadness. There is no happy hour. We cannot go back to the village because he is sick. Our plan to go to Miri had to be cancelled.

Bibi’s family life was affected after Jalil’s injury because they lacked finances, and their opportunity to interact with the social world was limited, leading them to feel alienated. Although Bibi and her family were “doing family” by “always staying at home together,” her young children were bored. Bibi’s view of family life was contradicted by her husband, the care-recipient, Jalil, partly because of difference in the needs of various members of the family. Bibi’s two-year-old son loved to be carried, but Jalil could not lift him. Although Jalil felt sad that he was unable to do this, he needed understanding from his family.

### ***Responding to disability***

After injury, participants spoke of their psychological, physical, social, and spiritual responses or reactions. These responses occurred during the initial stage of their lives post injury, which may be seen as period of ‘rehabilitation.’

Psychological responses related to survivors’ abilities to cope mentally with the accident and consequent impairment and disability. This involved reflection and self-evaluation of their attitudes, which led to their increased capacity to cope mentally. The initial stage of injury was the most difficult moment for all survivors, and having a positive attitude helped some of them to cope with the drastic changes to their lives. As participants had varied forms of injuries, the duration involved in coping varied significantly. Safri, who had an amputation below the knee, said that he coped within days, while Jalil, who survived SCI, took months to cope:

It took me more than a week to accept my reality. My attitude helped me. Feeling sad and crying will not make my leg come back. So, I accepted it. (Safri, left leg amputated)

At first, I was shocked and did not accept it. After thinking about it repeatedly for a few months, I finally accepted it. (Jalil, SCI)

Coming to terms with physical impairments for some involved coping with the pain associated with their disability. People with less severe injuries experienced less severe pain, as in-patients and post-hospitalization. Those with severe impairments experienced pain after medical interventions and after returning to their communities. For example, Uwai described that he coped with physical suffering for months before he was able to return to work: “I did not work for more

than a year. I endured my injury for a few months before I healed. I was hospitalized for four months. My bone was broken and it was taken out.”

The social contexts of coping involved families and non-family members. During hospitalization all survivors experienced isolation while after discharge; their families were involved, providing them with emotional, spiritual and practical support. For instance, Limah avoided contact with non-family members after her injury but her family members, especially her mother, helped her to cope with her self-exclusion and lack of confidence:

After the tragedy I interacted less with other people compared to when I was ‘normal.’ I was ashamed. I did not go out at all. I felt ashamed when with community members. Then, my brother invited my mother and me to visit him in Miri, to learn how to be independent. After that, I tried to think positively: there is no reason to be ashamed in front of other people because I was ‘normal’ before, then, I became disabled. Feeling ashamed to go out is not good. After becoming disabled, I was less confident to face the social world. I did not go out of the house. I was ashamed. Hiding from people, hiding! Now it is all right. I am involved in sport, work. I make myself happy. I create happiness and make jokes.

Limah’s strategies to cope with her impairment, including overcoming her feelings of shame and initiating interactions with members of her community, despite feeling awkward initially, demonstrates that coping with a disability involved “resocialisation” – the process of learning new norms, values, attitudes and behaviours (Henslin, 2007: 85). Several survivors spoke of the involvement of both families and friends in providing emotional, physical, spiritual and social support. Junid recounted his experience of living with a disability during rehabilitation, when he was totally dependent on family members and friends, and post rehabilitation when he became capable of performing several tasks: “I manage myself well now. In the past, when nobody was around to help, I could not do anything. Now I still need help from my family, for example, to put on my clothes or go to inaccessible places.”

Coming to terms with disability also involved non-family members, including the rehabilitation doctor, physiotherapist, employer and members of support groups for people with disabilities. For example, the Kuching Spinal Injury Association (KUSIA) was established in Kuching City to provide support for people living with SCI in Kuching and Samarahan. Jawan spoke of attending a seminar organized by the Department of Social Welfare in collaboration with the Sarawak Society of Disabled People, which became “the turning point” of his life, while his experience in a rehabilitation centre shaped his views of his capability. Duat also spoke of the benefits he gained from the training he attended, and Safri was grateful to his employer:

After the accident I was very sad and I could not accept my condition. I stayed in the longhouse for three to four years. Then, I attended training in a rehabilitation centre and furthered my training in Kuala Lumpur. After that, I have worked independently. (Duat)

My employer had no confidence in me at first. I proved to him that I could work. Now, he likes me. I have asked him to increase my salary. (Safri)

Safri had to demonstrate to a potential employer his capability to work by taking customers' orders and carrying food and drinks on a tray. After this demonstration, he was accepted as an employee in a coffee shop. Although younger customers sometimes scolded Safri for being slow in taking orders, they apologized after they discovered he had an amputated leg and was walking with prosthesis. Halim's employer, Mariam, said that she provided Halim with a job because she pitied him; while this attitude can have negative connotations, the Malay term lacks this valency. She treated Halim with respect, and she believed all people have dignity.

Most participants recounted their reactions to disability as 'step by step' within their capacity. Balan spoke of responding in 'chaotic' ways. Because he experienced dramatic changes functionally, the disability affected him severely and at a particular stage, he had had suicidal thoughts. Balan has since had to integrate all aspects of coping strategies, including psychological, physical, spiritual and intellectual, to manage his life:

I refused to eat, to drink for a few months, and I became very sick, and doctors were always trying to persuade me to take something, but I refused. Towards the end, they put a tube in my nose, I was fed by tube and I discovered that I was suffering. Moreover, I talked to myself: "Oh! If this is the case, I cannot die. Even when I wanted to die, they gave me tube." So, I might as well, I said, "I try to accept it." So, from that day, I started to take action, I started to ask friends to read the Bible to me. After six months, I started to like myself; I consulted a physiotherapist, met professionals. I used my mouth to open books, so that I could read, and I read, read, and read. Therefore, I started to take advice from people, so I started to feel better. My mind changed, my attitude changed. Slowly, day by day, week by week, month by month, and then, I can accept it. Of course, I can say that I do not accept it 100%, because I do grumble when things do not go that well. I grumble.

Balan's attitudes and responses may be viewed as an extraordinary achievement. Significant numbers of people in Malaysia die within a few days or weeks of being paralysed (from infection, primarily), yet Balan was living beyond the time expected by others. Balan had shared his experiences with a range of people, including schoolchildren, medical trainees and community members, via seminars and talks, especially after he went to live in a NGO-based institution. In an interview in a local newspaper in the middle of 2010, Balan concluded that his disability had taught him "to value life," implying that his capability to face severe physical impairments was linked to wider contexts. Balan's attempts to understand what had happened to him during the initial stage of his injury involved not only medical teams, friends, family and his reason, but also, most importantly, his faith in God. Other survivors, including Jalil and Adli, spoke too of using spiritual approaches to cope with their impairments and resultant disability.

## CONCLUSION

Survivors' perceptions of their social worlds were shaped by their experiences of living with their altered body, altered relationships and stigmatized identity. Long-term physical impairments and resultant disability affected the lives of survivors both directly (e.g. through loss of bodily function) and indirectly (the socio-psychological suffering survivors experienced as feelings of shame and sadness). Therefore, survivors' experiences were critically important in the context of

this study. Participants in this current study who had survived traffic accidents were coping with two types of identities in their daily lives – ‘personal identity’ and ‘public identity’ (Kelly & Millward, 2004), and survivors with severe impairments appeared to deal with more challenging social worlds, including their attempts to understand the meaning of their disability, which is not explain in this paper.

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### FOOT NOTES

<sup>1</sup> Dollah used the term to mean able-bodied people.

<sup>2</sup>Ideally, Dewi’s sister should have supported them, but this was not the case because she was poorer than Dewi.

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## Impact of Computational Thinking in Achieving High Order Thinking Skills at Selected Schools in Sarawak

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### ABSTRACT

*Computational thinking (CT) is a six-step approach that involves the processes of decomposition, pattern recognition, abstraction, algorithm, evaluation and logical reasoning that promotes greater levels of thinking and the development of soft skills such as critical thinking and problem solving. This approach was introduced by the Malaysian Ministry of Education (MOE) in 2017 as a component for achieving Higher Order Thinking Skills (HOTS) in its efforts of improving the quality of education in the country. Between 2017 and 2019, the Faculty of Computer Science and Information Technology (FCSIT) of Universiti Malaysia Sarawak (UNIMAS) organized the Computational Thinking and Computer Sciences (CTCS) teaching course across Sarawak to prepare teachers for this transition in the MOE's efforts of improving the quality of education on primary and secondary levels. From a population of 57 teachers, a select of 4 teachers involved in the course were interviewed to provide further insight into the effectiveness of CT in achieving HOTS.*

*Keywords: Computational thinking; Education; High Order Thinking Skills; Problem-solving skills; Soft skills development*

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### INTRODUCTION

Computational thinking (CT) is a process initially exclusive to computer scientists in complex problem solving during their encounters, then stressed as “a fundamental skill for everyone, and not just for computer scientists” that is to be taught at all education levels (Wing, 2006). Guzdial

(2008) cites that the natures of CT were believed to first exist in the 1960s through Alan Perlis' initiative of making programming a topic that must garner the attention of everyone due to its ability on the 'theory of computation', followed by the ideas of Seymour Papert in the 1980s that explored the idea of 'soap-sculpture mathematics'. These theories have since evolved into what Jeanette Wing introduced as computational thinking.

In the modern times, CT has established itself as a core element in many educational systems across the globe (Lockwood & Mooney, 2017) and as an approach in developing Higher Order Thinking Skills (HOTS) through nurturing a student's ability to create, evaluate and analyse (Zaharin et al., 2018). High-performing countries have made it integral to its education such as Finland and Singapore which passed with flying colours during its participation in the latest international large-scale assessment known as the Programme for International Student Assessment (PISA).

Numerous studies suggest that CT is an essential skill that must be applied for all backgrounds (Wing, 2006) in any subject (Hsu et al., 2018) that helps in fostering creativity and problem-solving abilities (Yadav et al., 2017). Influenced by the implementation of CT by high performers in PISA, Malaysia has followed suit through its integration of CT through the introduction of subjects in the primary and secondary level and the initiative of the Computational Thinking and Computer Sciences (CTCS) teaching program held nationwide.

For this study, its focus was directed towards the CTCS course held between 2017 and 2019 in Sarawak. Studies conducted about CT in Sarawak highlighted the changes of implementing CT in the teaching-learning process (Anuar et. al, 2020), the influence of CT towards performance (Shariman et. al, 2024) and the effectiveness of CT within STEM subjects (Hamid et. al, 2024), yet studies that observe the impact of CT towards HOTS are limited. This study asked the following questions; what are the teachers' perspectives towards the application of CT in the teaching-learning process, and what is the impact of CT towards the development of Higher Order Thinking Skills (HOTS) among students in Sarawak from the teacher's perspective?

To answer these questions, the study explored the teachers' perspective of applying CT in the teaching-learning process and explored the impact of CT towards the development of HOTS among students in Sarawak by observing why applying CT for teachers is a key component in achieving HOTS among their students. This study hopes to provide greater understanding in developing rationales for continuing CT as part of a key component in the syllabus specially designed for students in Sarawak. This is due to the diverse background setting of schools in urban and rural areas with each coming with unique circumstances. Moreover, this study hopes to provide deeper insight towards the CTCS teaching programme to increase its influence in the teaching-learning process.

## LITERATURE REVIEW

The turn of the new millennium saw the topic of computational thinking (CT) making a resurgence in the modern era, one that aligns the ideas of Perlis and Papert. Wing (2006) defines CT as a concept that can be applied at all levels of education, providing one with the avenue of problem solving. CT involves a four-stage approach in its application which are:

1. Decomposition: The scenario is broken down into smaller sub-scenarios,
2. Pattern Recognition: Similar characteristics are searched within the sub-scenarios,
3. Abstraction: Critical details are extracted from analysed sub-scenarios,
4. Algorithms: Also known as creation of algorithm, a solution fitting criterion of scenarios is designed.

Over the years, the four key stages have been a mainstay in many iterations of CT and over time have developed to include an additional two new stages (Shute et al., 2017) which were:

5. Evaluation: The constructed algorithm was assessed, and
6. Logical Reasoning: The feasibility of the created algorithm is justified.

In the educational technology space, most scholars agree that CT is an important 21st-century skill that develops the skills and abilities of complex problem-solving (Voogt et al., 2015) that can be applied in many fields, predominantly in mathematics, science and engineering (Angraini et al., 2024) and even in non-STEM subjects through a cross-disciplinary manner (Hsu et al., 2018). CT can be used and benefited by anyone of any background as it is considered a 21st century literacy (Mohaghegh & McCauley, 2016). The elements and components of CT has been adopted by numerous countries around the globe in its educational systems based on its track record of developing students' abilities to think critically and solve complex problems (Lockwood & Mooney, 2017), in addition to CT growing in global prominence of being both defined and applied in a classroom setting (Ogebo & Ramnarain, 2022).

Examples of said countries includes Finland and Singapore, both of which are high-performing countries that scored above the global average (OECD, 2023) in PISA, the triannual international large-scale assessment organised by the Organisation for Economic Co-operation and Development (OECD) that provides countries a perspective on the quality of education in their respective countries. PISA assesses 3 key competencies that are crucial in the modern day which are reading, mathematics and sciences (Goczek et al., 2021).

Finland's reform of its two-track education system kept in mind the nature of CT when it introduced its compulsory nine-year education system called peruskoulu that stressed on the importance of developing 21st century skills such as critical thinking, problem solving and communication to adapt to the 21st century competency (Lavonen & Korhonen, 2017). Furthermore, the roles of teachers are now being redefined where the boundaries of teaching are no longer limited within the school setting and have begun to expand into external networks (Tiippana et al., 2024). Finland establishes a knowledge-based society that encourages learning far beyond the 9-year compulsory system which has proven to be effective as it produced a very low dropout rate (Morgan, 2014).

Singapore is another example where its implementation of CT elements in the primary and secondary levels of education that observes the development of problems solving, critical thinking and algorithmic thinking, with the addition of adding programming subjects into its curriculum (Seow et al., 2019). This shift along with Singapore's approach on establishing 'thinking schools'

also changed the dynamics of parties involved in the school system where students are more active and engaged in the teaching process (Al-Thani, 2024) and brought with it the need of quality over quantity (Ng, 2021).

The main similarity that can be observed through the implementation of CT of the two high-performing countries are the development of 21st century skills in critical thinking and problem solving as the foundation in their education systems. Studies indicate that CT has shown positive results regarding its implementation into the teach-learning process due to its ability in developing competencies in problem-solving as it acts as a process in helping to create and analyse (Kale et al., 2018).

Its implementation is not just exclusive to the STEM field through multiple subjects (Weintrop, 2016; Rich et al., 2019), but it can also be applied in the non-STEM field through certain stages of CT (Hsu et al., 2018). Making CT as a key component in the teaching-learning process enables teachers to foster creativity (Yadav et al., 2017) that can be further applied for an individual (Angeli et al., 2016). Moreover, Zaharin et al.'s (2018) taxonomy model shows that CT shares many similarities with Higher Order Thinking Skills (HOTS) as the nature of both are thinking processes that support one another (See Figure 1).

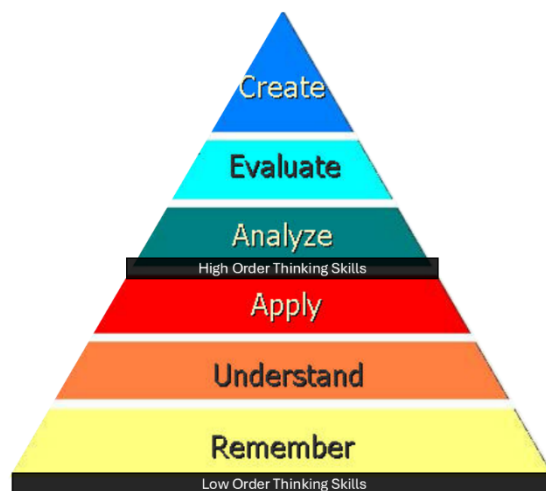


FIGURE 1. Zaharin et al.'s Iteration of Bloom's Taxonomy Model on HOTS (2018)

On the other hand, there are a set of challenges that must be noted to successfully adopt and implement CT. Several studies point out that teachers tend to find the lack of proper support and materials in implementing CT becoming a major deterrent in limiting the widespread adoption of CT in the classroom (Isharyadi and Juandi, 2020; Wahab et al, 2021) that ranges from resources to exposure towards CT. Changes to the curricula may also be a challenges to some as Rebeiro et al. (2013) notes that curricula change becomes a hurdle when it comes to implementing CT as there lays the need in understanding and change of disciplines.

In the local context, the Ministry of Education (MoE) implemented CT in its syllabus starting in 2017 by offering subjects such as Information Communication Technology (ICT known as Teknologi Maklumat Komputer @ TMK) for the primary level and Basic Computer Science (known as Asas Sains Komputer @ ASK) for the secondary level that exposes students to CT

(Lapawi & Husnin, 2020a). Malaysia followed the trend of applying CT by Finland and Singapore by making CT as a foundation for developing 21st century skills in critical thinking and problem solving, where this transition was a continuation of the HOTS initiative introduced in 2012 (Zaharin et al., 2018) which involved preparation for teachers for this shift through the CTCS teaching program; a comprehensive course held nationwide to provide teachers the knowledge and guidance on how to apply the CTCS teaching techniques in the classroom with the main objective of improving their teaching approach to increase the effectiveness of the teaching-learning process.

## METHODOLOGY

The study aimed at exploring first-hand experiences of carrying out computational thinking (CT) in the classroom through the lens of teachers and perspectives from past literature discussing the subject, thus establishing itself as an exploratory study surrounded by themes involving CT which includes CT in countries around the world, the impact of applying CT in education and challenges around CT.

The study took a qualitative approach to best obtain answers from descriptive answers (Tenny et al., 2017) which mainly relied on participants' (who are teachers) opinions on CT. Semi-structured interviews guided by an interview protocol were utilised to allow more expression and freedom. This was the main instrument utilised where four teachers of various backgrounds, experience and education levels from primary to tertiary who participated in the courses and practised CT in their classrooms shared their perspectives of CT in the classroom, the perspective of CT in achieving HOTS and challenges faced in implementing CT. Interviews were conducted digitally through Zoom as the platform to enable accessibility to teachers who had difficulties based on their location, with an average duration of 35 minutes per teacher interviewed. Prior to conducting the interview, teachers were informed that the interviews were being recorded to accurately note their perspectives.

Purposive sampling was applied to ensure the validity of the data as data provided must at least be from individuals or groups that are knowledgeable or experienced (Palinkas et. al., 2015), hence individuals eligible for this study must be participants of the CTCS teaching course between 2017 to 2019 and were currently teaching at the time the interviews were conducted. Once the teachers have been selected and invited for the interviews, teachers who participated were informed that the interviews were recorded.

To ensure the accuracy of data provided by teachers, the study practiced the Interviewee Transcript Review (ITR) suggested by Rowlands (2021) to ensure the validity of the data provided by the teachers. Each interview conducted was transcribed in verbatim to ensure any verbal expressions were not omitted to capture positive or negative reactions by teachers, which were then processed for teachers to review. Upon obtaining the teachers' approval towards the transcription, the study commenced initial coding of transcripts and utilised the NVivo 12 software to highlight similar key words and phrases from the teachers to establish baseline themes regarding questions asked regarding their experiences of CT.

Morgan (2022) suggests that a reflexive approach is better suited for studies that are completely qualitative, and subjectivity as an added advantage for findings. This approach in thematic analysis was utilised as the study relied on similar keywords and phrases provided by

teachers and past literatures. Prior to the final themes established, initial codes were pre-applied based on the literature review and interview protocol that were identified as ‘CT and Its Components’, ‘The Correlation of CT and HOTS’, and ‘Challenges of CT’.

Upon the completion of triangulation based on the literature review and processed transcription from the interviews, the study established ‘Teachers’ Understanding of CT and Its Components’, ‘Teachers’ Perspective on HOTS and Its Relationship to CT’ and ‘Challenges of Applying CT in the Classroom’ as the final themes which were established for this study based on key words and phrases within these themes were common throughout the interviews and literatures referenced in the study.

### SCOPE AND LIMITATION

A set of research limitations were experienced during the performance of this study. One prominent limitation is the low turnout of teachers who were willing to participate in the study which significantly reduced the potential opportunities for deeper insights. Of the 57 teachers who responded to our approach, only 4 teachers managed to participate in the interviews citing connectivity (particularly network issues) and unavailability of participating. Despite this, the limited number of participants provided vast perspectives on the impact of computational thinking (CT) towards their classroom and how their students perceived their lessons.

Another limitation experienced by the study is the period gap between the study and when the CTCS teaching course was conducted. The study began in 2022, and the teaching course took place between 2017 to 2019. This 3-year gap limited the exploration of ideas as teachers either had been transferred or retired since then.

### FINDINGS

TABLE 1: *Summary of Participants*

Teacher	Gender	Teaching Experience	Teaching Level
A	Male	10-19 years	Primary
B	Male	20-29 years	Secondary
C	Male	20-29 years	Tertiary
D	Male	10-19 years	Primary

#### *Teachers’ Understanding of CT and Its Components*

Teachers were asked questions regarding their understanding and experiences of CT in the classroom to their current recollection. This would observe the processes used in the classroom ranging from decomposition to logical reasoning. One teacher shared an insight that decomposition and algorithm are his favoured techniques as it easier for his students.

*“For me, I have better understanding of Decomposition and Algorithm. They are the most frequent I apply for the students. Just applying one concept is actually great because it’s easier for the kids.” (Teacher A)*

One teacher shares a more elaborate use of CT concepts, correlating with Teacher A’s idea on CT stating that decomposition is more favoured, however favouring pattern recognition with an example of its application in the teaching-learning process especially in Science.

*“There are basic concepts such as decomposition and pattern recognition; those are the ones I often use because among the students they understand more if we apply these concepts. So, there are parts which we will use these CT aspects to provide or improve a student’s understanding in food preservation in that chapter. It is because if we want to, we can use it (to help in) memorizing and analysing.” (Teacher D)*

The use of decomposition is a commonly used and preferred process amongst the teachers. One teacher provides a more advanced understanding of CT concepts by providing elaboration of each concept, where one of them that favours decomposition and algorithm provides a highly detailed explanation of each concept.

*“CT specifically has a lot of activities that is not necessarily computer-based, but then anything related to other subjects can also using CT. Actually, CT is there in our daily lives (only) just that we don’t name it as CT and so on. Decomposition of course has to break up the problem and then there’s the large number (and) all that; smaller compartments in order to solve the problem. Pattern recognition is a bit difficult even though the methods are basically same (to the others). Abstraction is an aspect of important and unimportant. Algorithm is where we need to make a solution. I feel like the most I used were decomposition and algorithm.” (Teacher B)*

In addition, one teacher suggests that CT can be applied in not just teaching particular subjects but can be applied universally in all subjects as it is more of a thinking process.

*“Using the methods in CT such as decomposition, pattern recognition, abstraction and also algorithm; these are used for solving problems. For me, CT isn’t just for (certain) subjects or technique. It can be expanded to other subjects because it undergoes a thinking process.” (Teacher C)*

### ***Application of CT in the Classroom***

When asked about the impact of its implementation in their classrooms, teachers had a lot of positives regarding its implementation particularly in helping them during class. One teacher pointed out that in theory it can help to attract the students’ attention and solidified the theory when testing through a particular subject (being physical education) which students find boring but changed when CT was applied. This being the elaboration of the teacher’s concern when CT was first introduced.

*“For example, in moral education and PE (physical education), sometimes the students (find it) boring. When divided into groups they undergo (activities involving) processes like decomposition the students are interested, wanting to find the answer at the end. It was acceptable by them.” (Teacher A)*

One teacher suggests that CT is not only just a means of an essential problem-solving skill, but it also helps to understand human behaviour through its approaches, along with supporting that CT can be applied to any subject due to its nature of being both a problem-solver and thinking process.

*“CT is an essential skill in problem solving, and understanding human behaviour is a basic concept in computer science. Besides that, my students have the chance to apply steps in arranging, analysing, and also presenting data or idea, logically and systematically. Using the methods in CT such as decomposition, pattern recognition, abstraction and also algorithm; these are used for solving problems. For me, CT isn’t just for certain subjects or technique. It can be expanded to other subjects because it undergoes a thinking process.” (Teacher C)*

Teachers also found that because CT is naturally a part of daily life and believe it to be an approach that can easily be applied to any subject, the core elements of CT can easily be applied to their teaching methods.

*“If we observe problem-solving, it is there in add maths, in maths, in various subjects... Even in computer sciences it’s actually there, but the characteristics of problem-solving itself is specific to a subject like Physics and so on, but the CT that’s there is generalized. The process is applicable to any subject.” (Teacher B)*

*“Teaching sciences have always stressed on using textbooks completely. Any activities related to science for example; conducting an experiment. We instantly use the stated experiment materials to teach a topic and from there we’re stressed on using CT in the experiment. It’s because it’s not far from it, so for me it’s no problem.” (Teacher D)*

When asked about the best way to summarise their opinion on CT, teachers had nothing but positive summaries on their experience on CT.

*“For example, we give a task to a student, I will use (the) decomposition technique and this is easy for the kids.” (Teacher A)*

*“It is systematic, most importantly (for) problem solving.” (Teacher B)*

*“It has really helped me particularly in guiding students better to find a new solution for problems that seem impossible to solve.” (Teacher C)*

*“CT can be applied in many things. Meaning, if we want to, we can use it for memorizing and can also for analysing.” (Teacher D)*

### ***Teachers’ Perspective on HOTS and Its Relationship to CT***

Venturing towards the teachers’ perspective of CT and its ability towards achieving HOTS. This avenue was initially discovered by observing the teachers’ perspective towards HOTS. The participating teachers found that the introduction of HOTS into the syllabus in 2012 was a great addition stating that HOTS reflects daily life; an ability that endorses thinking and capable of developing students’ ability in thinking:

*“HOTS is great because it encourages thinking. It is good if we do not stress it as an exam. HOTS is part of daily life; it can be anywhere. In fact, sometimes HOTS is also implemented into the co-curriculum but of course not all (in its entirety).” (Teacher B)*

*“HOTS for me is an ability to apply knowledge, ability to assess in reasoning and reflection to solve a problem. Making innovative decisions and ability to create something. HOTS is also a good and positive initiative where it has various advantages which are improving the abilities and capabilities that exists in a student. Students will be able to control, guide and measure the learning that they have empowered.” (Teacher C)*

*“HOTS is inserted and implemented in the daily teaching plan. This means that the teacher will plan every daily lesson and must use HOTS, though it’s not compulsory. They must state which part of HOTS they have applied to the day’s lesson. Currently, the usage of HOTS is very important.” (Teacher D)*

In addition, one teacher notes that the use of HOTS can be difficult for students as it becomes complex for students that are not as independent which becomes a cause for struggle for them:

*“HOTS might be quite difficult for (certain) students because (if) we want to break it down; the teacher needs to do it one-by-one. Only competent and skilled students can answer HOTS questions. For very weak students, they cannot answer. In groups, maybe they can answer HOTS questions. Individually in a test, weak students will not be able to answer.” (Teacher A)*

Teachers were then asked when they were first introduced to CT, and teachers stated that the nature of CT shared many similar outlooks towards developing the thinking abilities of a person. The concepts covered in CT are essential skills for HOTS. The close relation between the two were explored from the teachers’ experience and discovered that CT acts as a tool that helps a student to achieve the level of HOTS. In other words, they work in parallel with CT acting as the approach and HOTS as the status. In this scenario, CT acts as they key to achieve HOTS.

*“CT is a tool in the direction of high order thinking (skills). That’s exactly what it is. If we are to directly go to high order thinking, while weak students do not get it; these students will jump around in thoughts. CT will guide students to the level of high order thinking.” (Teacher A)*

*“CT can cause HOTS to be carried out systematically. Before this we press on HOTS’ end product; it should be mind-mapping, the 8 mind maps. To have that as a product, we need to have a process... With CT, we can promote it as a way to obtain the product, it definitely supports our efforts to cultivate HOTS to obtain students that practice HOTS... For me it is something that support each other.” (Teacher B)*

*“I strongly agree. Both have their own strengths, both shape the thinking capabilities and cultivate thinking abilities among students. Besides that, they also help teachers to improve a certain practice, in teaching and learning activities.” (Teacher C)*

*“I agree from what I understand. For me, CT can be used in many things. If we wanted to use it for remembering we could, for analysing it can be used in many places, (and) that’s why I use CT a lot in teaching.” (Teacher D)*

### **Challenges of Applying CT in the Classroom**

Challenges of practising CT by the teachers were then explored. The study found that class size plays a role in the development of students’ abilities, as teachers found that a small class size provides a great environment for the development of their students as they can provide full supervision to the class simultaneously. Bigger classes prove to be a greater challenge for teacher to be able to control and provide adequate supervision to their students.

*“I once had 41 students here (in a class). We are not able to control the class (better). The important part here is class control. If there is no (control) then it can’t be done. I’ve tried it, however, if the class is too full it is difficult to do.” (Teacher A)*

*“A moderate group of students however needs time.” (Teacher C)*

In addition to class size, a couple of teachers suggest that the lack of facilitation pose as a challenge in practicing and applying CT successfully in the class. This includes responsibilities, exposure of students, and support in schools. One teacher noted that commitment is an issue where the number of tasks they have on top of teaching made this challenging and not as manageable.

*“It is rarely touched except if the administration followed this course. We have to explain to the PPD that some teachers followed the same course. This is what the administration may not have noticed.” (Teacher A)*

*“At the initial stages, of course the workload was there, but we make an effort with an open mind prioritising the students. Still, it becomes a problem.” (Teacher C)*

*“One challenge is the exposure to students at the early stages. In the house, they are not exposed to well-equipped CT tools. Many schools still face problems, even us where at the end the results differ. Also, if the head of department does not support, there is nothing we can do about it.” (Teacher D)*

One teacher suggests that certain teachers may be content with what they have learnt and have decided to not explore better opportunities in expanding their knowledge.

*“Sometimes teachers in schools they do not want (to) expand their knowledge anymore. It’s like ‘That’s enough’. They are satisfied with the level (they are at).” (Teacher B)*

## **DISCUSSION**

The discussion of the study focuses on the impact observed by teachers regarding the practising of CT in the classroom and what was experienced by teachers which may range from change in environment to student behaviour. In addition, this section also observed the close connection between CT and HOTS where both share the nature as thought processes that looks towards problem-solving where both works in parallel with each other. Finally, challenges in

implementing CT are also discussed in this section where difficulties in fully practising CT by teachers due to the dependency of support and facilitation.

The overall observation of CT by teachers highlighted the overwhelming positive support and perspectives of teachers when practising CT in the classroom. As Voogt *et al.* (2015) suggested; CT is a critical modern-day skill that develops skills and abilities in complex problem-solving which can be applied by any person of any background (Mohaghegh & McCauley, 2016) as constantly outlined by Teachers B and C. The findings from the study align with these ideas as teachers would use select stages to assist in their teaching, yet a greater number of perspectives would significantly help in further establishing this idea where the positive feedback obtained would resonate with other teachers who were not involved in the interviews. In addition, due to CT's highly systematic process which gives clarity and structure on carrying out activities, this further helps in developing students' thinking abilities through the development of rationale and approach which is observable by all teachers involved in the interviews.

However, the limited number of perspectives of four creates questions regarding the validity and viability of the teachers' opinions. This was one of the study's major concerns as a bigger number of at least 10 teachers was the initial target, and the unfortunate low turnout was mainly contributed to the limited access of teachers to connectivity and internet stability which was also experienced during the interviews where stutters and freezes happened often. On the other hand, this study was focused on exploring the perspectives of teachers regarding their experiences towards CT and compensated the lack of participation through the depth of data provided by teachers as samples in qualitative studies are commonly small as the depth of data is a foundation for this type of inquiry (Vasileiou *et al.*, 2018).

Although CT can be predominantly applied in mathematics, science and engineering (Angraini *et al.*, 2024) yet it has been observed that CT can be applied in non-STEM subjects (Hsu *et al.*, 2018). This was highlighted by Teacher B where CT can be applied universally in any subject and through Teacher A provides additional examples such as Moral Education and Physical Education as it is a systematic process than just a set of concepts.

This allowed an avenue opening for discussions regarding the ability of CT in assisting teachers developing HOTS among their students as indicated by all teachers in the interviews. HOTS was an initiative introduced by the MOE in 2012 as their initiative in improving the national quality of education. CT was then introduced as the next step in improving quality, where a similarity was observed as both are processes that looked towards problem-solving (Zaharin *et al.*, 2018). The findings provided a better understanding towards the connection of CT and HOTS, and a revision represented by Figure 2.

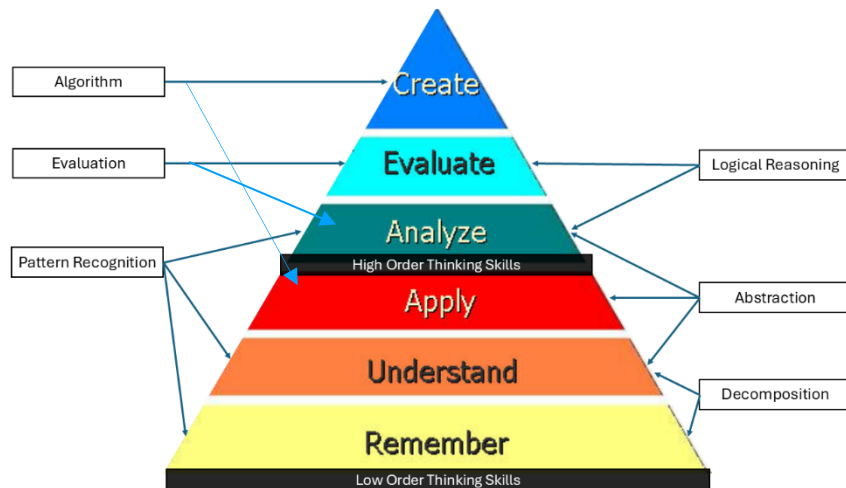


FIGURE 2. Connection of CT towards Zaharin et al.'s Iteration of HOTS Taxonomy Model

Based off the Bloom's Taxonomy Model by Zaharin et al. (2018), the study found that each component of CT supports HOTS from the bottom-up and plays multiple roles in every aspect. Before proceeding to the next levels, each step must be completed from the first step as it covers the first foundations from the Lower Order Thinking Skills (LOTS) starting by remembering. It is noticeable that few concepts are multidimensional and acts as a buffer to proceed to the next stages of thinking skills particularly decomposition, pattern recognition and abstraction.

These 3 concepts cover the first foundations in achieving HOTS as it develops the ability to remember, understand and apply which are identified as LOTS. Upon the mastery of LOTS, this takes students to the first step in HOTS where they develop the ability to analyse that first requires the CT concept of pattern recognition followed by logical reasoning. This would then allow students to proceed to the next stage of evaluate which involves the CT concept of evaluation. As the finale, with the development of all 5 concepts, this allows one the ability to create which can be nurtured by applying the CT concept of algorithm.

The concepts of CT applied towards the taxonomy model are based on the correlation that were discovered between the concepts of CT and HOTS. The study suggests decomposition being applied for the concepts of remember and understand are attributed to the need of breaking down ideas into smaller parts for an easier approach in recollecting ideas which can help students to understand a subject. Next, the study suggests that pattern recognition is well-applied for the concepts of remember, understand and analyse. Pattern recognition is the identification of repeated elements among ideas which overlaps with the three concepts as the use key points are foundational for the three.

Furthermore, the study suggests abstraction being applied for the concepts of understand, apply and analyse. Abstraction focuses on extracting important information from one or multiple sources, and this process is applied when an individual understands a subject. This requires them to apply what they have deduced and to an extent analyse whether the important point is suited to a problem. The study suggests algorithm (creation) is best applied towards the concept of create and apply which comes from the perspective that when a solution is designed, the concept of create and apply is present during the process. To determine the

effectiveness of a proposed solution, the study suggests evaluation is best applied to the concept of evaluate and analyse. This is where the process whether effectiveness of an applied solution is assessed is compatible with a problem or whether a more effective solution can be made, thus involving the process of evaluating and analysing the effectiveness of a solution. Finally, the study suggests that logical reasoning is best applied to the concept of evaluate and analyse. The function of logical reasoning looks towards justifying whether a solution is the best option possible that can be applied to a problem, and this process overlaps with the concept of evaluate and analyse. It is important to note that these concepts are highly cross-functional and may interlap more often than one may presume and can be adapted to suit unique circumstances.

However, despite the similarities of the two existing sets of challenges faced in implementing CT in the classroom. On top of change in curricula which acts as a starting challenge for teachers (Rebeiro et al., 2013) requiring changes of disciplines to teaching, additional challenges would include teachers faced in guiding students with no exposure to CT (Wahab et al, 2021) and teachers' preparedness towards the transition to CT covering materials, intervention with students and support for teachers (Isharyadi & Juandi, 2023). The findings of the study found that these are issues currently faced by teachers as bigger class sizes limit the amount of involvement that teachers can take during certain processes, teachers finding difficulty in guiding students who have limited exposure towards CT and the need of support for teachers in continuing to practise CT in the classroom.

## CONCLUSION

The first major finding of the study is the overall positive reception of CT from teachers. One key theme observed is that teachers found CT as a thinking process that can be applied in many areas and not limited to a particular field. Decomposition has been noted as one of the most applied processes that has helped teachers in the classroom given the frequency of its application among teachers and have found increased interest in learning as it is easier for their understanding in the subject taught. On the other hand, this study also found that the limited number of interviewees due to the large geographical setting and limited accessibility to more participants confined the ability of further exploring potential challenges that other teachers may face when applying CT in the classroom.

Another major finding from the study is that teachers found CT as a key that aids in achieving HOTS. Some key points include CT as a systematic approach in achieving HOTS, shapes thinking capabilities of their students and as a universal approach that can be used in solving problems. CT acts as the missing link that enables HOTS to be achieved amongst students to its potential which supports the opinions of teachers that HOTS and CT were great initiatives when introduced and implemented.

In addition, there are several challenges faced when practising CT that most commonly involve class sizes and facilitation. Teachers cite that a large class of students consequently affects the effectiveness of its implementation as classroom control decreases for teachers. Facilitation covers the tasks that teachers are assigned, and the necessity of support from the school hierarchy to allow teachers to effectively practise CT. CT has established itself as an initiative that promotes the development of students' thinking skills and as an avenue for students to achieve HOTS. Future studies are recommended that further explore more perspectives of teachers in this area to help provide more evidence in supporting the initiatives

revolving around CT by obtaining larger samples that explore the perspectives of more teachers with more unique backgrounds and exploring the application of CT in schools with more diverse background such as urban or rural and accessibility to certain infrastructure such as materials and equipment.

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## User Requirement Analysis on Website: Tourism in Lundu, Sarawak

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### ABSTRACT

*This study explores the critical features essential for a tourism website based on the feedback from visitors to Kampung Pugu, Lundu. The study highlighted several functionalities deemed indispensable by the visitors to enhance the online presence of the destination and make the user experience more engaging and accessible. The key features identified include comprehensive and engaging content with detailed descriptions of local attractions and activities, high-quality images and videos to visually represent the destination, and a user-friendly interface that allows for easy navigation and interaction. An effective online booking system, robust social media integration, and real-time updates about local conditions are also emphasized. Additionally, interactive tools such as chatbots, feedback forms, and Frequently Asked Questions (FAQs) can improve visitor's interaction and service quality. This study explored the perspectives from entrepreneur and visitors on their use of tourism related websites. The report concluded that these features are crucial in transforming the website into a more effective tool for promoting tourism and facilitating a smooth experience for potential tourists, thereby contributing significantly to the growth and appeal of tourism in Lundu.*

*Keywords: user requirement; content analysis; tourism website; rural tourism; rural entrepreneur*

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### INTRODUCTION

Sarawak, known for its diversity of attractions and facilities, is devoid of a centralized and updated repository of information. Tourists and locals often face challenges in accessing comprehensive and accurate information regarding attractions, accommodations, and tourism-related facilities, which can affect travel planning and the overall visitor experience. Tourism encompasses economic, social, cultural, environmental, and psychological dimensions, involving travel outside

one's usual environment (Coleman & Crang, 2002). In addition, tourism governance plays a significant role in shaping policies and strategies that influence tourism development across different countries and regions (Öztürk, 2022). The concept of tourism also extends beyond simply visiting a destination, emphasizing engagement with places, experiences, and cultural interactions that contribute to the overall tourism experience (Gohar, 2022). As tourists increasingly rely on digital platforms to obtain information and plan their journeys, the need for a comprehensive and accessible tourism website has become increasingly important. Therefore, understanding the website requirements that support tourism promotion and visitor engagement is essential, particularly for emerging tourism destinations such as Kampung Pugu, Lundu.



FIGURE 1. *Google Maps View of Lundu District, Sarawak, Malaysia*

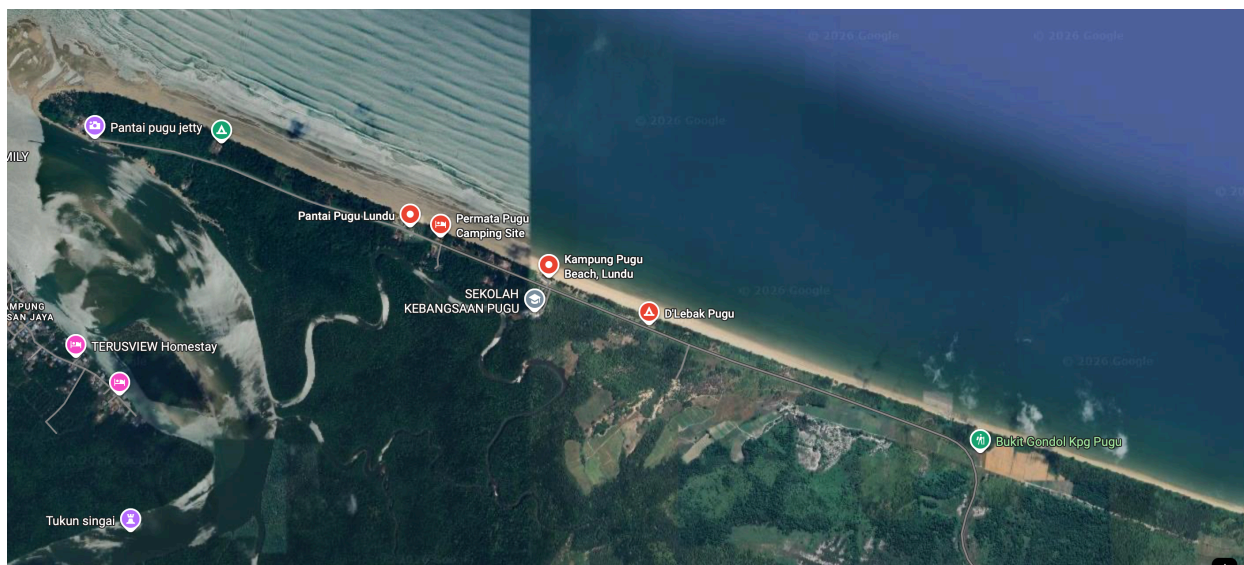


FIGURE 2. *Satellite Map View of Kampung Pugu, Lundu, Sarawak, Malaysia*

Kampung Pugu was once just a rural area that nobody reaches and know about the existence but it changes after the development of Pan Borneo Highway (Adib Povera, 2015). This major infrastructure project is enhancing Sarawak's connectivity and accessibility, which is crucial for the region's economic and social development. The highway's construction has not only represented a leap in the physical infrastructure but also underscores the importance of adapting and embracing new challenges and technologies in project management and execution (Bernama, 2023). This can be seen as parallel to the digital transformation in the tourism industry. Just as the highway enhances physical connectivity, digital platforms improve virtual accessibility to tourism destinations (Pencarelli, 2020; Marino et al., 2022). Both infrastructure projects and digital platforms serve as vital components in promoting tourism, where ease of access and efficient communication are key to attracting visitors (Buhalis & Law, 2008).

The government of Sarawak has given significant support for accelerating the downstream economic impact of the infrastructural project for the rural community. Hamsien Atar, Ministry of Rural Development Sarawak, stated that Lundu and Sematan would be turned into a major tourism hub for the district of Tanjong Datu (Borneo Post Online, 2017). This initiative intended to leverage the natural beauty of the area, including beaches, mountains, rivers, and unique flora and fauna, to attract tourists year-round. The plan aims to enhance a home-grown infrastructure like hotels and resorts, handicrafts, and enhancement projects. These initiatives align with the government efforts to create job opportunities in the region and enhance their standards of living.

The advancement of the Pan Borneo Highway, encompassing the addition of a pathway to Kampung Pugu, has been instrumental in the metamorphosis of this countryside locale into a more reachable and potentially prosperous site. The capacity of the initiative to be a pivotal force for the inhabitants of Sarawak underscores the significance of infrastructure enhancement in propelling advancement and growth in distant and marginalized areas. The inclusion of a route to this village in the Pan Borneo Highway project significantly impacted its accessibility and visibility. Prior to the development of the highway, Kampung Pugu may have been relatively unknown and difficult

to reach due to its outskirts location. The construction of the highway that passed through and near Kampung Pugu had turned the place more accessible to travelers, tourists, and investors.

Addressing the challenges in the online visibility of tourism sector in Lundu is crucial for unlocking the full economic, cultural, and environmental potential of the region. Previous studies have shown that tourists increasingly rely on the internet and digital platforms to search for travel information, compare destinations, and plan their journeys (Buhalis & Law, 2008; Pencarelli, 2020). This shows how crucial the relationship between tourism and the internet is, leading to increasing demand for online tourism information. The tourism sector plays a significant role in the country's economic landscape, and with technological progress, intelligent travel applications have become a crucial component of this industry. By establishing a robust online presence through a well-designed website, the area can attract a wider audience, promote sustainable tourism practices, and foster a deeper appreciation for its unique cultural and natural heritage (Cristobal-Fransi et al., 2020; Marino et al., 2022). Furthermore, an effective online platform can serve as a vital tool for local businesses, enabling them to reach a broader market, streamline operations, and enhance the overall visitor experience (Pencarelli, 2020; Huang, 2020). This study has significant implications for the strategic development of tourism in Sarawak, contributing to the region's economic development and cultural preservation.

### ***Background of Study***

A rural area with a low exposure in digital technology was the main research gap identified in this study. The essence of the challenges faced by tourism in Pugu can be distilled into two primary concerns which are the lack of online presence and reservation system and lack of insights from entrepreneur and visitor (Sahabat Alam Malaysia, 2023). The development of a user-friendly and informative website hinges on identifying the critical features and functionalities that enhance user experience and accessibility. Despite the excess of web development tools and guidelines, there remains a lack of consensus on the essential elements that meet the diverse needs of users across different domains (Hamit, 2003; Huang, 2020). In a way to respond from Premier of Sarawak request about development of Sarawak (MalayMail, 2023; Bernama, 2023), these two highlighted the main problems face by the community especially in engaging the development in technology of Sarawak. Research by Hamit (2003) shows that several key issues could hold back tourism development in the local area. These issues can be grouped into three main themes: infrastructure, tourism institutional framework and community. The study argued that each of these areas if not addressed, could slow down tourism growth. Therefore, it is crucial that different levels of government step in and tackle these problems quickly. Only by resolving these issues can tourism become a real engine for local development and benefit the community as a whole. This gap in understanding could lead to the creation of websites that fail to effectively engage users or deliver content in an accessible and efficient manner, thereby impeding the reach and impact of digital platforms (Pencarelli, 2020; Firmansyah et al., 2023).

The website for a tourism destination is not just a marketing tool but a crucial gateway for potential visitors to gain insights and form perceptions about the place (Horng & Tsai, 2010; Chung et al., 2015). However, not all websites are effective in engaging users, and some may fall short in crucial areas such as content quality, user interactivity, and information relevance (Huang, 2020; Firmansyah et al., 2023). The issue extends to the incorporation of real-time information and

interactive digital features, which are vital in shaping the modern traveller's decision-making process (Pencarelli, 2020; Kontogianni & Alepis, 2020). In the context of Pugu, there is a significant gap in understanding the perceptions and expectations of visitors and entrepreneurs towards tourism websites. This lack of insight could lead to the development of online platforms that was not align with the needs and preferences of these key stakeholders, potentially hampering the growth and sustainability of the local tourism industry. Effective development and management of tourism websites require a detailed understanding of these perspectives to tailor content, functionality, and marketing strategies that resonate with both visitors and business operators (Godovykh & Tasci, 2020; Chung et al., 2015). This study had involved the point of view from entrepreneurs and visitors who have visited Pugu.

Given the importance of these factors, the inadequate understanding of which specific website features resonate with visitors became an issue in developing the rural tourism sector such as Pugu. Addressing this gap is crucial for local tourism entrepreneurs who want to attract and satisfy a global audience. Therefore, this study had identified the essential features and functionalities that constitute an effective tourism website and to understand visitor and entrepreneur perspectives toward such websites, which are vital for the tourism industry's growth in the region (Godovykh & Tasci, 2020; Peong et al., 2023). The region's tourism sector suffers from a glaring absence of a digital footprint, rendering it virtually invisible to potential visitors. This gap significantly hinders the accessibility of information about the area's attractions, accommodations, and cultural events, crucial for planning visits. Moreover, the lack of a streamlined online reservation system complicates the booking process, detracting from the user experience and potentially discouraging prospective tourists. Concurrently, the lack of insights and opinions from the people in that area especially the entrepreneur and visitor further worsen the problem, limiting the reach and engagement with potential development. This dual-faceted problem has not only affected the growth of tourism in Pugu but also represents a missed opportunity for local businesses and the community at large.

In this study, two main problems were identified. The first was the lack of online presence and reservation systems to support tourism promotion and business operations. The other was the lack of insights from entrepreneurs and visitors regarding the requirements and expectations of tourism websites. Based on these problems, this study had answered two relevant questions: the essential features and functionalities required to create a user-friendly and informative website and the perspectives of visitors and entrepreneurs towards tourism websites in Pugu.

To address the first question, the essential attributes and features necessary for a functional and user-friendly tourism website that can support the growing tourism sector in Pugu, Lundu were examined. The effectiveness of a tourism website is not limited to its visual appearance but also the quality, accessibility, and accuracy of the information provided (Horng & Tsai, 2010; Huang, 2020). Therefore, the existing practices in information dissemination and user interaction to ensure that visitors receive reliable and engaging content were evaluated. Understanding visitors' needs and preferences is important in developing website content and functionalities that are relevant to potential users (Firmansyah et al., 2023; Jantan et al., 2023). The findings can offer practical recommendations for the website development in rural tourism and help to reduce the gap between users' expectations and their actual digital experience (Kontogianni & Alepis, 2020; Pencarelli, 2020).

In addition, the study has explored the perspectives of visitors and entrepreneurs towards tourism websites in Pugu. The insights gathered from both groups are important for understanding their expectations, experiences, and satisfaction regarding the digital representation of tourism destinations. Understanding these perspectives can provide valuable information for improving tourism websites, strengthening digital tourism initiatives, and supporting local tourism development (Godovykh & Tasci, 2020; Chung et al., 2015). By considering the views of both visitors and entrepreneurs, a more comprehensive understanding of the website requirements needed to support tourism promotion and enhance visitor engagement in Pugu were made visible (Peong et al., 2023; Pencarelli, 2020).

## LITERATURE REVIEW

According to the Official Portal of the Sarawak Government, Sarawak covers approximately 124,449.51 square kilometres along the northwest coast of Borneo and contains extensive rainforest ecosystems that support a wide variety of flora and fauna (Sarawak Government, 2023). The attractiveness of Sarawak is increasingly recognized not only within Malaysia but also by neighbouring countries such as Singapore, Brunei, and Indonesia. Tourism statistics show that the number of foreign visitors increased to 1,414,443 from January to August 2023 compared to 206,328 during the same period in 2022 (Malay Mail, 2023). This growth highlights the increasing importance of effective tourism promotion and information dissemination. The internet has emerged as an important platform for tourism marketing, providing travellers with access to information, travel planning tools, and destination experiences before their visit. The availability of multimedia content, interactive features, and online services has transformed the way tourism destinations promote themselves and engage with potential visitors, making tourism websites an essential component of modern destination marketing.

The rapid evolution of digital technologies is reshaping the landscape of the tourism industry, highlighting a critical digital skills gap that is evident across various sectors. The tourism and hospitality sectors in Europe are currently grappling with bridging this gap, identifying a pressing need for skills such as online marketing, social media proficiency, and the ability to navigate and utilize operating systems efficiently (Cristobal-Fransi et al., 2020). This underscores a broader industry challenge; to remain competitive and responsive to consumer demands, there is an urgent need for upskilling in digital competencies.

The advent of Tourism 4.0 and Smart Tourism, as explored by Pencarelli, signifies the transformative impact of digitalization on the travel experience, from planning and booking to the in-destination experience (Pencarelli, 2020). This digital revolution not only enhances operational efficiency but also elevates the consumer experience, making it imperative for destinations like Pugu, Lundu, in Sarawak to integrate digital solutions that cater to the modern traveler's expectations. However, the digital transformation journey is not without its pitfalls. Abbasian Fereidouni and Kawa (2019) draw attention to the darker aspects of digitalization in tourism, such as the risk of creating digital dependencies and the potential for data control issues, which can lead to a form of digital colonialism in tourist destinations. This presents a cautionary tale for implementing digital strategies, emphasizing the importance of a balanced approach that respects privacy and ensures data security. Studies on tourism digitalization suggest that comprehensive digital adoption can lead to increased competitiveness, improved visitor experiences, and better

decision-making capabilities, highlighting the pivotal role of digital technologies in enhancing the attractiveness of tourist destinations (Pencarelli, 2020; Marino et al., 2022).

In the context of Sarawak's tourism in Pugu, Lundu, these insights underscore the critical need for a strategic digital presence that not only addresses the digital skills gap among industry stakeholders but also leverages the full spectrum of digital tools to enhance the tourist experience. It is undeniable, there are few developing entrepreneurs who already own a very good website, but it happened only to big companies in that area for example Retreat Resort and Roxy Hotel, Sematan. By embracing digital transformation, Sarawak can enhance its visibility, streamline communication and booking processes, and ultimately, enrich the overall experience for visitors, ensuring a sustainable and competitive edge in the global tourism landscape (Pencarelli, 2020; Marino et al., 2022).

Digital platforms such as websites play a pivotal role in the modernization and globalization of the tourism sector, acting as catalysts for entrepreneurship, market expansion, and enhanced visitor experiences. These platforms not only streamline the operational aspects of tourism businesses but also offer a medium for interactive engagement with potential and current tourists, facilitating a more personalized and enriching travel experience. Digital platforms are revolutionizing tourism by fostering novel forms of connectivity and communication, delineating a digital era marked by enhanced competitive dynamics and value creation (Marino et al., 2022). This shift towards digitalization is further underscored by studies that elaborate on the advantages of digital platforms, including innovation stimulation, market expansion, and cost reductions, which collectively contribute to the growth of the tourism industry (Pencarelli, 2020; Marino et al., 2022).

The role of digital solutions in promoting interactions between tourists and local stakeholders highlights the potential of digital platforms in facilitating collaborative innovation and the co-creation of tourism experiences (Pencarelli, 2020). This notion of collaborative tourism is further supported by Pencarelli (2020), who explores the impact of the digital revolution on the tourism industry through the concepts of Tourism 4.0 and Smart Tourism. The integration of digital media within tourism has also revealed the significant influence of user-generated content, augmented reality, and virtual reality on tourist behaviour and industry practices (van Nuenen & Scarles, 2021). Studies on tourism digitalization further exemplify the crucial role of digital technologies in enhancing marketing strategies and the overall tourist experience (Cristobal-Fransi et al., 2020; Pencarelli, 2020). The importance of user-centred design in developing digital platforms for tourism also underscores the need for design principles and marketing strategies that respond effectively to consumer preferences (Domínguez Vila et al., 2018). Abdelrady (2023) and Gao (2021) further discuss the concept of smart tourism platforms and their effectiveness in supporting tourism destinations, demonstrating the potential of digital technologies in fostering collaborative networks and expanding tourism services. These scholarly contributions collectively depict a tourism industry at the cusp of digital transformation, where the adoption of digital platforms is not merely a trend but a strategic imperative that caters to the modern traveller's expectations, drives innovation, and supports the sustainable growth of tourism businesses worldwide.

## *Communication, Information and E- Commerce*

In way to emphasize the feature of a website for tourism choosing the suitable methodology is the main concern and in this study Content analysis is a versatile research method used extensively in qualitative research to interpret meaning from the content of text data. It involves systematic coding and examining of text such as written or oral communication to identify patterns, themes, or biases (Hsieh & Shannon, 2005). Each type uses different coding schemes and has distinct processes for deriving meaning from the data (Hsieh & Shannon, 2005).

The significance of ensuring that e-commerce platforms are easy to use and accessible to everyone, including individuals with disabilities, is paramount. This necessity is directly applicable to tourism websites, which must cater to a wide and inclusive audience (Domínguez Vila et al., 2018). This implies that information should be presented in a manner that is comprehensible and navigable for all users, ensuring inclusivity and enhancing user experience. Previous studies on website evaluation and usability imply that the content on tourism websites should be meticulously curated and analyzed to ensure it meets the informational needs of tourists (Law et al., 2010; Huang, 2020). A thematic analysis can help in understanding the recurring themes that are most pertinent to potential visitors of Pugu, Lundu, and tailor the website content accordingly.

The classification of Web 2.0 tourism websites indicates the significance of integrating social media and interactive features for effective communication (Burgess et al., 2010). For Pugu, Lundu's tourism website, this could mean incorporating platforms where users can exchange information and experiences, which in turn could enhance the site's engagement and community-building aspects. Chung and Law (2003) suggest that performance indicators for hotel websites could also be applicable to broader tourism websites. These indicators include information accuracy, ease of booking, and responsiveness, elements that are crucial for the e-commerce functionality of a tourism website. The balance between informational content and relational strategies, such as user engagement and customer service, highlights the need for a tourism website to not only inform but also connect with and retain visitors through effective communication channels (Escobar-Rodríguez & Carvajal-Trujillo, 2013). Burgess et al. (2010) establish benchmarks for website design and marketing, which could guide the development of Pugu, Lundu's tourism website, ensuring that the site not only provides valuable information but is also effectively marketed and designed with user experience in mind. Previous studies on tourism website evaluation also emphasize the importance of website usability, navigation, and information quality in supporting online tourism services (Law et al., 2010; Huang, 2020). Cantoni et al. (2011) discuss the relationship between hotel websites and booking engines, an aspect critical for the e-commerce success of a tourism website. For Pugu, Lundu, integrating a reliable and user-friendly booking system can significantly influence the decision-making process of potential tourists.

The model proposed by Cristobal-Fransi et al. (2020) gauges the efficacy of digital presence in enhancing tourist experiences. According to the Information dimension, a critical evaluation of the Pugu tourism website would focus on the adequacy and accessibility of information provided, key aspects that determine the quality of the tourist's pre-visit planning phase (Law et al., 2010; Horng & Tsai, 2010). In the realm of Communication, effective

engagement with potential visitors through interactive platforms such as chatbots, social media, and blogs is essential (Cristobal-Fransi et al., 2020; Burgess et al., 2010). This dimension also extends to the website's ability to cater to a global audience through multilingual support, thereby expanding its reach and utility (Buhalis & Law, 2008).

When it comes to E-Commerce capabilities, the security and privacy of online transactions on the tourism website are paramount. This includes the implementation of robust encryption and secure payment gateways, which are crucial in building trust with the user (Kim et al., 2009; Cristobal-Fransi et al., 2020). Lastly, the Additional Features dimension suggests that modern tourists look for indications of security and data protection, as well as a seamless user experience across various devices, signalling the website's adaptability and technological adeptness (Cantoni et al., 2011; Domínguez Vila et al., 2018). Each of these dimensions provides a framework for examining the Pugu tourism website's content, design, and functionality, ensuring a comprehensive analysis that aligns with current best practices in tourism website development (Law et al., 2010; Huang, 2020).

TABLE 1 illustrates the model discussed by Cristobal-Fransi et al. (2020), which will be used as the main reference in this study. It shows four dimensions that they highlighted as the variables in their study. They proposed a model that focuses on assessing the content of websites in the industrial tourism sector, focusing on four key categories. This proposed model is geared towards examining the efficacy of these websites in engaging their intended audiences. Utilizing content analysis, the model was applied to 128 tourism-related resources in Catalonia to pinpoint opportunities for the deployment of Web 2.0 tools and to identify areas of weakness that could be optimized for enhanced competitiveness in the industry.

TABLE 1. Model Proposed by Cristobal et.al (2020)

<b>Dimensions</b>	<b>Definition</b>
<b>Information</b>	This dimension evaluates the quality, relevance, and accessibility of information provided on a tourism website. It examines whether visitors can easily obtain information related to attractions, activities, operational details, pricing, cultural elements, and destination-specific content. The availability of accurate and up-to-date information is important in supporting visitor decision-making and enhancing the overall tourism experience (Cristobal-Fransi et al., 2020; Huang, 2020; Vila et al., 2021).
<b>Communication</b>	This dimension evaluates a website's ability to facilitate interaction and engagement with users. It includes communication tools such as contact forms, social media integration, feedback mechanisms, and interactive features that support two-way communication between tourism providers and visitors. Effective communication features help improve user engagement and strengthen relationships with potential tourists (Firmansyah et al., 2023; Pencarelli, 2020; Vila et al., 2021).
<b>E-Commerce</b>	This dimension evaluates the website's ability to support online transactions securely and efficiently. It focuses on functionalities such as online booking systems, payment options, transaction security, and the protection of users' personal information. These features contribute to user trust and convenience when making tourism-related purchases and reservations online (Cristobal-Fransi et al., 2020; Huang, 2020; Vila et al., 2021).
<b>Additional Features</b>	This dimension assesses supplementary functions that enhance the overall user experience, including mobile responsiveness, accessibility, multilingual support, privacy protection, and integration with emerging digital technologies. These features improve usability and allow tourism websites to serve a wider range of users across different platforms and devices (Cantoni et al., 2011; Firmansyah et al., 2023; Peong et al., 2023).

TABLE 2 outlines a multi-dimensional framework that serves as a benchmark for evaluation, where each dimension encompasses a set of sub-dimensions that further specify the criteria for assessment. By applying these dimensions to the analysis of the websites, this study would be able to comprehensively evaluate the digital strategies employed by the tourism operators in Pugu and Lundu, Sarawak, and determine their effectiveness in engaging with and attracting tourists.

TABLE 2. *Main Dimensions Details*

Main Dimension	Sub-dimensions	Details
Information	Content Quality	Accuracy, relevance, and timeliness of information.
	Multimedia Integration	Use of images, videos, and virtual tours.
	Operation and Pricing	Information on operation hour, schedules and pricing.
	Cultural Representation	Representation of local culture and attractions.
	Languages	Availability of information in multiple languages.
Communication	Social Media Integration	Links to social media pages and engagement enhancement.
	Contact Information	Ease of finding contact details.
	Interactive Features	Chatbots, forums, or Q&A sections.
	Feedback Mechanism	Collection and utilization of user feedback.
Electronic Commerce	Online Booking	Availability and ease of booking.
	Payment Options	Variety and security of payment methods.
	Security Measures	SSL certificates, privacy policies, and data protection practices.
Additional Functions	Website Accessibility	Compliance with web accessibility standards.
	Mobile Responsiveness	Usability on different devices.
	Privacy Policies	Clarity and comprehensiveness of privacy statements.

The information stresses the significance of content quality, which includes the accuracy, relevance, and timeliness of the information presented on the website. Multimedia integration, like the use of images, videos, and virtual tours, enhances the user's virtual experience and can serve as a preview of what tourists can expect (Firmansyah et al., 2023; Huang, 2020). Operational details such as hours, schedules, and pricing, along with cultural representations, contribute to the site's comprehensiveness and cater to the practical and cultural interests of potential tourists (Hornig & Tsai, 2010; Buhalis & Law, 2008; Cristobal-Fransi et al., 2020).

The communication dimension reflects the website's capacity to facilitate interaction between the service provider and the user. Sub-dimensions such as social media integration and contact information highlight the need for a platform to effectively engage users and provide essential details for inquiries and support (Burgess et al., 2010; Das Gupta & Utkarsh, 2014). The importance of interactive features like chatbots and forums emphasizes the trend towards interactive user experiences in digital tourism marketing (Chiou et al., 2010; Pencarelli, 2020; van Nuenen & Scarles, 2021).

In the context of Electronic Commerce, online booking systems are evaluated for their user-friendliness and efficiency, with payment options and security measures forming the basis of trust in online transactions (Cristobal-Fransi et al., 2020; Kim et al., 2009). The variety of payment methods and the implementation of security measures like SSL certificates are indicators of a website's credibility and reliability (Kim et al., 2009; Escobar-Rodríguez & Carvajal-Trujillo,

2013). Additional Functions assess the technical prowess of the website, such as mobile responsiveness, which is increasingly vital as mobile internet usage grows (Firmansyah et al., 2023; Domínguez Vila et al., 2018; Jantan et al., 2023). Additionally, the clarity and depth of privacy policies are paramount in ensuring users' trust and compliance with data protection regulations (Kim et al., 2009; Godovykh & Tasci, 2020).

## **METHOD AND APPROACHES**

To accomplish the stated objectives, the study employed a mixed-methods research design, combining quantitative data analysis with qualitative insights. The initial phase involved an extensive review of existing tourism websites, focusing on user interface, functionality, and content relevance. This review helped in identifying best practices and key features that contribute to a user-friendly and informative website. Subsequently, a series of surveys and interviews will be conducted with potential visitors and local entrepreneurs to gather firsthand insights into user preferences and expectations. This dual approach had ensured a holistic understanding of the requirements for an effective tourism website.

In the development of the research design for the study on tourism websites, the study employed a mixed-methods approach. The combination of qualitative exploration and quantitative analysis allows researchers to gain an in-depth understanding of user needs while supporting the findings with measurable evidence (Godovykh & Tasci, 2020; Cristobal-Fransi et al., 2020). This approach enables a more comprehensive understanding of tourism website requirements and stakeholder expectations. Studies in tourism website evaluation have demonstrated the importance of combining different sources of data to better understand user behaviour, website effectiveness, and visitor experiences (Huang, 2020; Firmansyah et al., 2023). This strategy not only enhances the depth of understanding but also ensures methodological rigor, which is critical in achieving reliable results. Additionally, the integration of qualitative and quantitative data allows researchers to address research questions from multiple perspectives and generate richer insights into complex tourism-related issues (Godovykh & Tasci, 2020).

Finally, content analysis and stakeholder-based evaluations have highlighted the importance of methodological clarity and systematic data interpretation when examining tourism websites and user experiences (Hsieh & Shannon, 2005; Cristobal-Fransi et al., 2020). This awareness had guided the present study in ensuring that both qualitative and quantitative phases are well integrated and contribute effectively to the overall research objectives. Together, these studies reinforce the methodological framework adopted in this research and support the use of mixed methods as an appropriate approach for investigating tourism website requirements and stakeholder perspectives.

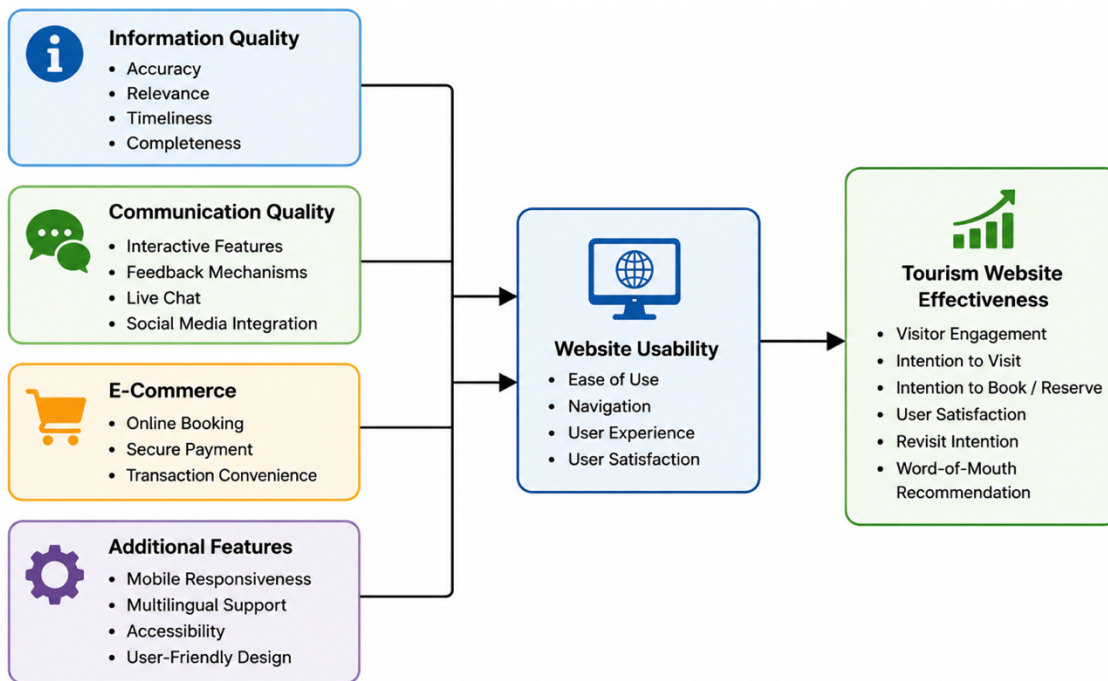


FIGURE 3. *Conceptual Framework*

FIGURE 3. illustrates the conceptual framework presented the central role of website content in aligning the interests and objectives of visitors and entrepreneurs within the tourism industry. This synthesis of content strategies comprises four main domains:

a) **Information:** The website must offer accurate, relevant, and current information to assist visitors in their decision-making process (Horng & Tsai, 2010; Vila et al., 2021). This content serves as the bedrock of the website, educating visitors about what Pugu, Lundu has to offer, from local attractions to cultural practices.

b) **Communication:** Interactive features, such as user feedback mechanisms and live chat services, are key in establishing a two-way communication channel between the destination and the visitor (Burgess et al., 2010; Gonçalves et al., 2018). This interactivity not only enhances the user experience but also serves as a valuable touchpoint for entrepreneurs to engage with and learn from potential customers.

c) **E-Commerce:** The convenience of online transactions is essential for modern tourism websites. With the incorporation of secure booking and payment systems, the e-commerce aspect facilitates the actual conversion of visitors into tourists, reflecting the operational effectiveness of the website (Cristobal-Fransi et al., 2020; Kim et al., 2009).

d) **Additional Features:** These include aspects such as multilingual support, mobile responsiveness, and accessibility, ensuring that the website is user-friendly for a diverse audience, including those with disabilities (Domínguez Vila et al., 2018; Gonçalves et al., 2018). Features like these not only widen the reach of the website but also adhere to universal design principles, reflecting an inclusive approach to digital tourism.

The research framework underlined the pivotal role that well-crafted website content plays in aligning the objectives of visitors and entrepreneurs within the tourism industry. At its core lies information domain related to the foundational content that informs potential visitors about the destination's offerings, from attractions to cultural insights, facilitating informed decision-making (Hornig & Tsai, 2010; Buhalis & Law, 2008). Communication is the next crucial domain, enabling a dynamic two-way interaction through feedback mechanisms and live chats, enhancing the visitor experience while offering businesses valuable insights (Burgess et al., 2010). E-Commerce functionality is integral as well, streamlining the transition from browsing to booking, with secure payment systems reflecting the website's operational effectiveness (Cristobal-Fransi et al., 2020; Kim et al., 2009). Lastly, additional features such as multilingual support and mobile responsiveness ensures the website's accessibility to a diverse audience and adherence to inclusive design principles (Domínguez Vila et al., 2018). This comprehensive approach to website content is presented as essential for the success and growth of the tourism sector, ensuring a seamless and engaging online user experience. The framework underscores the need for a holistic strategy where each component works in concert to create a synergistic user experience. Entrepreneurs can utilize this framework to identify key areas for development or enhancement in their digital offerings, ensuring their websites serve as effective portals for promoting tourism to Pugu, Lundu (Cristobal-Fransi et al., 2020; Pencarelli, 2020).

## FINDINGS AND DISCUSSION

This study targeted 100 respondents involving 50 from entrepreneur and 50 from visitor. However, it only managed to get a total respondent of 60 with 30 entrepreneurs and 30 visitors.

### *Descriptive analysis in communication, information, E-Commerce and additional Features*

There were 60 respondents of the study which involved 30 entrepreneurs in the tourism industry and 30 visitors. The findings are presented according to four dimensions: Information, Communication, E-Commerce, and Additional Features. The analysis focuses on the mean and standard deviation values to identify the relative importance of each feature from the perspectives of entrepreneurs and visitors. Overall, both entrepreneurs and visitors rated all information elements highly, indicating the importance of accurate, relevant, and accessible information on the website (Table 4). The highest-rated item was the provision of accurate information on visit duration, opening times, pricing, and tour schedules (entrepreneurs = 4.900; visitors = 4.767). The use of real images, virtual tours, and accurate destination information also received high ratings from both groups. Although information in multiple languages received the lowest mean scores, it was still considered important.

TABLE 4. *Descriptive Analysis in Information Variable*

Item	Entrepreneur		Visitor	
	Mean	Standard Deviation	Mean	Standard Deviation
The website needs to accurately describes the location, including its economic activity, address, origin, and history	4.833	0.531	4.333	0.844
The website needs show the real and use images, and virtual tours.	4.867	0.434	4.500	0.630
The website should show and listed accurate visual information about visit duration, opening times, pricing, and tour schedules.	4.900	0.403	4.767	0.504
The website should represent local cultures and attractions.	4.667	0.661	4.300	0.794
The website should be available of information in multiple languages.	4.433	0.935	4.100	0.845

Entrepreneurs and visitors generally agreed on the importance of communication features for the tourism website (Table 5). Social media integration received the highest rating from entrepreneurs (M = 4.967), while clear and accessible contact information was highly rated by both groups. Feedback mechanisms were also considered important, reflecting the need for continuous interaction and service improvement. Although chatbots received the lowest mean scores, they were still viewed positively. The standard deviation values indicated a relatively high level of agreement among respondents, with greater variation observed among visitors regarding the use of chatbots. These findings are consistent with previous studies that highlight the importance of communication and interactive features in enhancing user engagement and supporting tourism marketing efforts (Pencarelli, 2020; Firmansyah et al., 2023).

TABLE 5. *Descriptive Analysis in Communication Variable*

Item	Entrepreneur		Visitor	
	Mean	Standard Deviation	Mean	Standard Deviation
The website needs to link social media pages and engagement enhancement.	4.967	0.183	4.300	0.750
The website need to provide clear and accessible contact information, including telephone and e-mail, for inquiries and support.	4.833	0.461	4.667	0.606
The website should provide chatbot to ask enquiries.	4.533	0.730	3.933	1.048
The website should provide feedback for improvement and comment.	4.933	0.254	4.600	0.563

Both entrepreneurs and visitors place strong importance on e-commerce features (Table 6). A variety of payment methods received the highest ratings from both groups, followed closely by online booking functionality and the protection of user privacy. The relatively low standard deviation values suggest consistent responses across all items. These results highlight the importance of secure, convenient, and user-friendly transaction features in supporting tourism website effectiveness. Similar findings have been reported by Cristobal-Fransi et al. (2020) and

Gonçalves et al. (2018), who noted that online booking systems, secure payment options, and data protection are important factors influencing user trust and online transactions.

TABLE 6. *Descriptive Analysis in E-Commerce Variable*

Item	Entrepreneur		Visitor	
	Mean	Standard Deviation	Mean	Standard Deviation
The website should be available for direct online booking.	4.867	0.434	4.467	0.681
The website should be able to variety payment method such FPX, Debit, S-Pay etc.	4.900	0.305	4.667	0.547
The user privacy should be protected include all the data after doing payment or booking.	4.867	0.434	4.883	0.379

Entrepreneurs and visitors considered additional website features important for improving usability and accessibility (Table 7). Compliance with web accessibility standards received the highest rating among entrepreneurs, while visitors placed greater emphasis on clear privacy statements. Accessibility across multiple devices was also viewed positively by both groups. The standard deviation values indicate moderate agreement among respondents, suggesting that these features contribute to a trustworthy and inclusive user experience. This finding supports previous studies that emphasize the role of accessibility, mobile responsiveness, and user-centred design in improving website usability and user satisfaction (Huang, 2020; Vila et al., 2021; Firmansyah et al., 2023).

TABLE 7. *Descriptive Analysis in Additional Features Variable*

Item	Entrepreneur		Visitor	
	Mean	Standard Deviation	Mean	Standard Deviation
The website should have compliance with web accessibility standards.	4.733	0.521	4.400	0.724
The website is accessible with different devices such laptop, tablet etc.	4.300	0.837	4.433	0.728
The website should have clarity and comprehensiveness of privacy statements.	4.167	0.747	4.533	0.629

### ***Entrepreneur perspectives on technology improvement and essential website features***

Overall, entrepreneurs emphasized the need for stronger technological infrastructure and a comprehensive digital platform to support tourism development (Figure 4). The most common concern was the lack of adequate digital infrastructure, particularly internet connectivity. Respondents suggested the installation of additional communication towers to improve network coverage, as reliable connectivity is viewed as a prerequisite for supporting digital tourism initiatives and online business operations (Pencarelli, 2020; Kontogianni & Alepis, 2020).

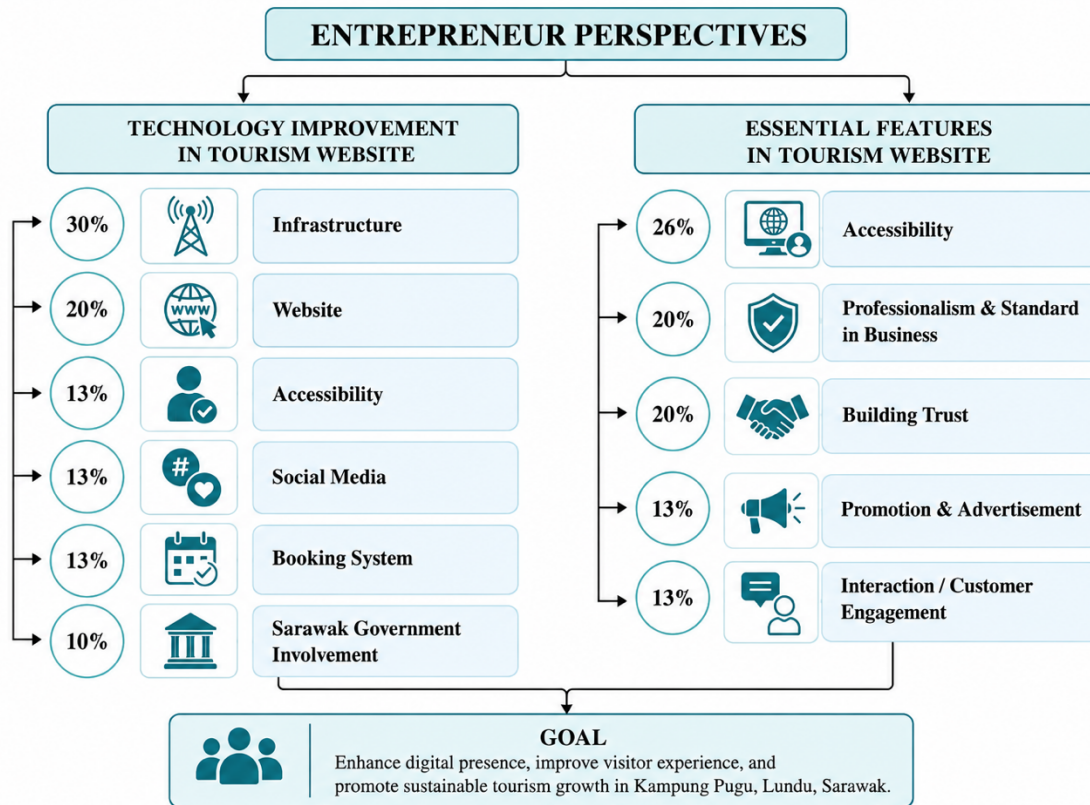


FIGURE 4. *Entrepreneurs Perspectives on Technology Improvement and Essential Website Features*

A recurring theme among the respondents was the need for a centralized tourism website that serves as a one-stop platform integrating local tourism-related businesses and services. Such a platform would improve access to information, simplify booking processes, and strengthen interactions between tourists and service providers (Heripracoyo et al., 2021). Entrepreneurs also highlighted the importance of digital marketing, particularly through social media, to increase the visibility of Kampung Pugu and attract both domestic and international visitors (Afren, 2024). The implementation of e-commerce solutions, including online booking systems and digital payment facilities, was viewed as an important step towards improving convenience and enhancing the visitor experience (Cristobal-Fransi et al., 2020; Huang, 2020).

The findings indicated that entrepreneurs regard accessibility as the most essential feature of a tourism website. Accessibility encompasses ease of navigation, user-friendliness, and the ability to cater to a diverse range of users. Professionalism, business standards, and trust-building were also identified as important considerations, reflecting the need for a credible and well-organized online presence (Chung et al., 2015). Respondents emphasized that tourism websites should contain high-quality images, videos, accurate destination information, interactive booking systems, clear contact information, and social media integration. Interactive features such as chatbots, feedback mechanisms, and user engagement tools were also considered valuable in enhancing communication and visitor experience (Firmansyah et al., 2023; Vila et al., 2021).

In addition, entrepreneurs had stressed the importance of transparency through the display of licensing information, terms and conditions, and other formal documentation that can strengthen user trust (Das Gupta & Utkarsh, 2014). Social media integration was viewed as a useful tool for promotion, customer engagement, and community building (Pencarelli, 2020). Collectively, these findings suggest that entrepreneurs view a tourism website as more than a source of information; it is a strategic platform for promotion, communication, customer engagement, and business transactions. By improving infrastructure, strengthening digital marketing efforts, implementing e-commerce capabilities, and developing a centralized tourism platform, Kampung Pugu has the potential to enhance its digital tourism presence and attract a wider audience of visitors (Buhalis & Law, 2008; Pencarelli, 2020).

**Visitors’ perspectives on technology improvement and essential website features**

Generally, visitors emphasized the importance of strengthening digital infrastructure, improving access to information, and enhancing the online presence of the destination (Figure 5). The findings indicated that the most important area for improvement is the provision of detailed and comprehensive information (40%), followed by accessibility, promotion and advertisement, building trust, and interaction. These findings suggested that visitors value technology that enabled them to obtain accurate information, interact with service providers, and make informed travel decisions.

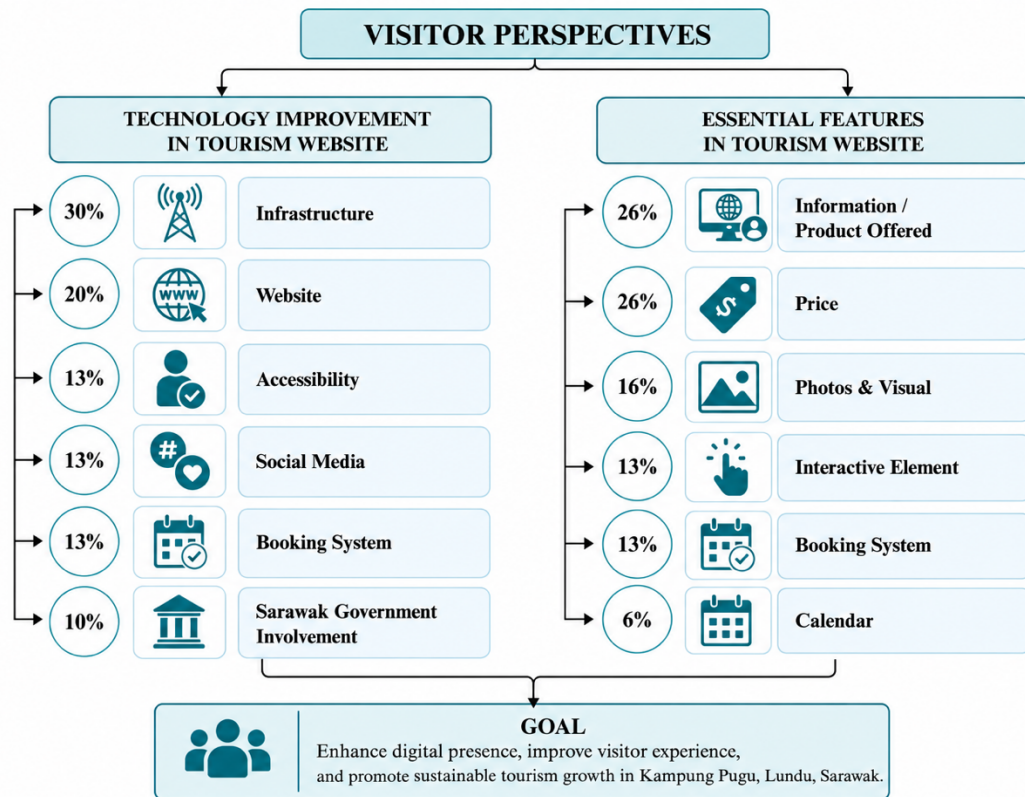


FIGURE 5. Visitors Perspectives on Technology Improvement and Essential Website Features

Respondents highlighted the need for stronger digital infrastructure and more interactive websites that provide detailed information about local attractions, cultural activities, accommodations, and tourism products. Similar to the entrepreneurs' perspectives, visitors emphasized the importance of utilizing digital marketing strategies and social media platforms such as Facebook, Instagram, TikTok, and travel-related applications to increase the visibility of Kampung Pugu and attract a wider audience (Afren, 2024; Pencarelli, 2020). Visitors also suggested the development of a centralized tourism platform containing information on local attractions, events, and tourism services, supported by interactive maps and digital guides (Heripracoyo et al., 2021).

The findings revealed that visitors place significant importance on information availability and pricing transparency, both representing the highest proportion of essential website features (26%). Visitors expected tourism websites to provide detailed descriptions of attractions, activities, products, and services, allowing them to make informed decisions before visiting the destination. High-quality photos and visual content were also identified as important features, highlighting the role of visual presentation in enhancing destination attractiveness and visitor engagement (Firmansyah et al., 2023). Interactive elements, including feedback platforms and communication tools, were viewed positively as they support engagement and improve the overall user experience (Vila et al., 2021).

In addition, respondents emphasized the importance of an efficient online booking system that enables visitors to check availability and make reservations conveniently. This finding supports previous studies that identify booking functionality and transaction convenience as important determinants of tourism website effectiveness (Cristobal-Fransi et al., 2020; Huang, 2020). Visitors also highlighted the need for multilingual support, social media integration, real-time updates, feedback mechanisms, and chatbot services to improve accessibility and communication. These features contributed to a more user-friendly and interactive digital environment while enhancing visitor confidence and satisfaction (Firmansyah et al., 2023; Peong et al., 2023).

Overall, the findings showed that visitors expected a tourism website to function as a comprehensive information and communication platform rather than merely a promotional tool. The integration of engaging content, visual elements, booking systems, interactive features, and multilingual support can significantly enhanced the visitor experience while strengthening the digital presence of Kampung Pugu, Lundu. These improvements are essential for increasing destination visibility, attracting potential tourists, and supporting the sustainable development of the local tourism sector (Buhalis & Law, 2008; Pencarelli, 2020).

## CONCLUSION

This study highlighted the critical need for a robust online presence that integrates comprehensive and engaging content, high-quality visuals, user-friendly interfaces, effective online booking systems, and strong social media integration to cater to both visitors and entrepreneurs. These features are crucial in promoting tourism and improving the user experience, which in turn can significantly contribute to tourism growth and economic development in the region (Buhalis & Law, 2008; Pencarelli, 2020; Cristobal-Fransi et al., 2020). The findings suggested that by

implementing these digital strategies, Kampung Pugu, Lundu can strengthen its position as a tourism destination for both local and international tourists while leveraging digital technologies to improve visitor engagement, accessibility, and satisfaction (Domínguez Vila et al., 2018; Huang, 2020; Vila et al., 2021).

Overall, this study contributes to the growing body of knowledge on digital tourism and tourism website development, particularly within the context of rural tourism destinations. The findings provide practical recommendations for improving tourism websites and supporting destination promotion through digital platforms. These insights may serve as a useful reference for future tourism development initiatives in Kampung Pugu, Lundu and other rural tourism destinations seeking to enhance their digital presence, improve visitor experiences, and strengthen their competitiveness in the digital tourism environment (Afren, 2024; Firmansyah et al., 2023; Peong et al., 2023).

### *Potential topics for future study*

The article outlined several areas for further investigation. Future study may include a more diverse and larger sample size which would enhance the reliability and applicability of the results to a broader context. More relevant stakeholders should be involved as either participants, partners or consultants such as the Sarawak Tourism Board, District Office or NGOs related to the economic regeneration for community. In addition, other variables that might influence the effectiveness of tourism websites may also be explored. This could include studying the impact of cultural differences on website preferences, the role of social media integration in enhancing user engagement, or the effectiveness of different types of interactive content. Understanding these variables can help in developing more tailored and effective website features. Conducting longitudinal studies could provide insights into the long-term effects of website features on tourist engagement and satisfaction. Such studies can track changes over time, providing a dynamic view of how tourists' preferences evolve and how effectively the website adapts to these changing needs.

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Artificial intelligence (AI) tools were used on a limited basis during the preparation of this manuscript. SciSpace and Perplexity were used to assist in summarising selected literature, while ChatGPT was used to assist in illustrating several figures and improving the presentation of content. Grammarly AI was used for spelling, grammar, and language refinement. All analysis, interpretations, findings, and conclusions presented in this study were independently reviewed and verified by the researcher.

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RESEARCH NOTE

## The AI Frontier in Borneo: Balancing Innovation and Human Talent in Kuching's Future

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### ABSTRACT

*Under the direction of the Sarawak Digital Economy Blueprint (SDEB) and the Post COVID-19 Development Strategy (PCDS 2030), Sarawak is following a strategic roadmap to become a high-income developed state by 2030. This change transforms Kuching into an AI-powered smart city hence utilizing digital innovation and artificial intelligence (AI) to upgrade industries like healthcare and agriculture. Advanced infrastructure, such as the Irix Tier IV Data Center and a commitment to 60% renewable energy, support this objective. However, the state is dealing with a "Human Capital Paradox" that is typified by a talent gap of 60% between traditional schooling and the quick advancement of technology. Sarawak has entered a "bootcamp" phase in response to this, offering industry-aligned micro-credentialing to guarantee workforce preparedness. A human-centric strategy that gives algorithmic responsibility and data privacy under the Personal Data Protection Act is a top priority necessary for effective implementation. Sarawak's digital frontier prioritizes social inclusivity through rural Digital Community Centers, guaranteeing that technical developments resulting to fair and sustainable prosperity for all residents.*

*Keyword: regional context; workforce dynamics; small medium enterprises (SMEs); organizational focus; strategic & theoretical; artificial intelligence*

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### INTRODUCTION

As a key component of sustainable innovation and organizational competitiveness, the quick development of artificial intelligence (AI) is currently changing the global economic landscape (Boonmee et al., 2025). AI-powered systems that use machine learning and predictive analytics to find hidden patterns and produce useful insights are revolutionizing industries all around the world (Ramachandaran et al., 2025). It is anticipated that this digital transformation will play a major role in helping Sarawak reach its objective of becoming a developed, high-income state

by 2030. According to the state Sarawak Digital Economy Blueprint 2030 (2023) and Post COVID-19 Development Strategy 2030 (2021), the digital economy, which is largely driven by cutting-edge technologies like artificial intelligence, will generate up to 48,750 new high-paying jobs and contribute about 20% of Sarawak's GDP (RM56.4 billion). Figure 1 illustrates the strategic progression from digital foundations to Sarawak's ultimate socio-economic goals

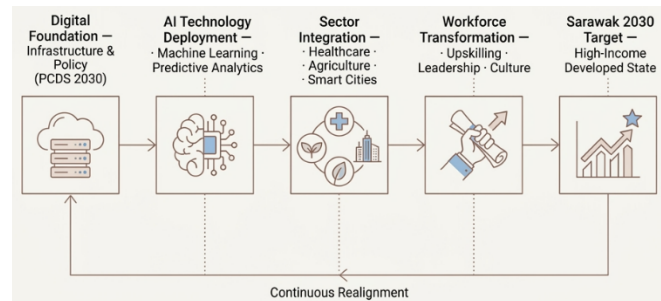


FIGURE 1. Sarawak State Government Target 2030

This diagram outlines a five-stage journey: establishing a Digital Foundation (Infrastructure & Policy), deploying AI Technology (Machine Learning), achieving Sector Integration (Healthcare, Agriculture, Smart Cities), and executing Workforce Transformation (Upskilling). The final goal is to reach the Sarawak 2030 Target of becoming a high-income, developed state, supported by a cycle of "Continuous Realignment" to ensure the strategy remains effective.

### ***The Digital Transformation of Sarawak***

To navigate the post-pandemic era, the Sarawak Government launched the Post COVID-19 Development Strategy 2030 (PCDS 2030) in July 2021. This strategy provides a comprehensive roadmap for transforming Sarawak into a thriving society driven by data and innovation. Central to this vision is the Sarawak Digital Economy Blueprint 2030, which outlines specific actions to establish the state as a leading regional AI and digital economy powerhouse. According to the Sarawak Digital Economy Blueprint 2030 (2023), the state aims to secure its future by strengthening digital foundations and adopting frontier technologies to ensure it is not left behind by the global wave of digitalization (*Post COVID-19 Development Strategy 2030, 2021; Sarawak Digital Economy Blueprint 2030, 2023*).

### ***A Socio-Economic Catalyst***

AI is increasingly recognized not merely as a collection of technical tools, but as a socio-economic catalyst that will fundamentally redefine how residents of Kuching and the wider Sarawak region work and live. On one hand, it offers a compelling value proposition for businesses by automating repetitive tasks, enhancing operational efficiency, and enabling data-driven decision-making. On the other hand, its implementation serves as a transformative force that impacts social inclusivity and household income. By integrating AI into sectors such as healthcare, agriculture, and smart city management as seen in the Kuching Smart City Master Plan the technology becomes a vehicle for raising standards of living and improving the overall well-being of the community (Islam et al., 2025; *Sarawak Digital Economy Blueprint 2030, 2023*).

## *The Imperative for a Human-Centric Workforce*

The final success of the AI transition hinges more on the deliberate creation of a "human-centric" workforce than on the purchase of technology, notwithstanding Sarawak's ambitious technological goals and extensive infrastructure initiatives under PCDS 2030. A fundamental alignment of organizational culture, leadership commitment, and the ongoing upskilling of those who must interact with these systems effectively are all necessary for realizing the benefits of AI (Boonmee et al., 2025; Islam et al., 2025; Ramachandaran et al., 2025).

## **KUCHING AS AN AI-POWERED SMART CITY**

A crucial aspect of the Sarawak Digital Economy Blueprint 2030 (2023) and the Post COVID-19 Development Strategy 2030 (2021) is the goal of transforming Kuching into a world-class smart city. The goal of this evolution is to establish a "Smart Sarawak" where better governance and increased economic growth are achieved via the integration of cutting-edge systems and skills. According to the Sarawak Digital Economy Blueprint 2030 (2023), the Sarawak government views Kuching as a major regional hub where digital technologies, especially artificial intelligence (AI), function as a catalyst for enhanced efficiency across all economic and social sectors. Figure 2 visual representation details the multi-layered architecture required to transform Kuching into a smart city.

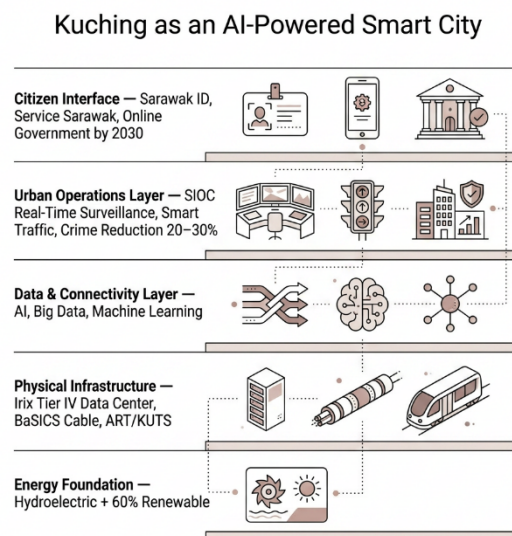


FIGURE 2. *Sarawak State Infrastructure*

The architecture is built on five distinct layers: an Energy Foundation (60% renewable energy), Physical Infrastructure (Irix Data Center and ART/KUTS mobility), a Data & Connectivity Layer (AI and Big Data), an Urban Operations Layer (real-time surveillance via SIOC), and a Citizen Interface (Sarawak ID and online government services).

### ***From Hydro-Energy to Data Centers***

A strong and durable infrastructure foundation supports the achievement of this objective. The investment in superior, eco-friendly data infrastructure is a crucial part of this basis. For example, Sarawak developed the Irix Tier IV Data Center, the first of its type in the state, with the goal of supporting huge data processing needs in a carrier-neutral and

environmentally friendly manner. The Batam Sarawak Internet Cable System (BaSICS) ensures worldwide connectivity by offering the fastest latency path between Sarawak and Singapore, enabling quick cross-border data flows necessary for AI applications (*Sarawak Digital Economy Blueprint 2030*, 2023).

To fuel this digital growth, energy sustainability is equally important. Sarawak is a leader in renewable energy thanks to its rich water resources, especially hydroelectric power, which makes up a sizable amount of its energy capacity mix. The state intends to maintain at least 60% renewable energy in its capacity mix by 2030, which includes investigating the production of hydrogen to power the Autonomous Rail Transit (ART) and other green mobility alternatives, according to the PCDS 2030 (2021). Using low-emission technology and digital integration to enhance urban connectivity, the ART project, a component of the Kuching Urban Transportation System (KUTS), represents a significant advancement in smart city mobility (*Post COVID-19 Development Strategy 2030*, 2021; *Sarawak Digital Economy Blueprint 2030*, 2023).

### ***Smart Urban Management***

Optimizing urban living through improved operational efficiency and data-driven decision-making is the main goal of integrating AI and digital technology in Kuching. This effort is supported by the Kuching Smart City Master Plan, which focuses on areas like as digital government, safety, and mobility. The Sarawak Integrated Operation Centre (SIOC), a centralized "Operating System" for the city, is at the core of this efficiency (*Sarawak Digital Economy Blueprint 2030*, 2023).

In order to handle vital urban services, the SIOC uses AI, machine learning, and big data analytics in addition to providing round-the-clock real-time surveillance. Smart technology, including smart traffic lights, are being used in traffic management to improve flow and lessen congestion. Additionally, the SIOC is anticipated to improve public safety, with objectives to lower crime in Kuching by 20–30% by integrating sophisticated surveillance into the system (*Sarawak Digital Economy Blueprint 2030*, 2023).

The goal of administrative services is to offer government in a smooth, citizen-driven manner. By 2030, the state wants all government services to be provided online. Platforms like Sarawak ID, which enables a single digital identification for all government transactions, and Service Sarawak, which allows multi-channel access via kiosks and mobile apps, are used to do this. These technologies can produce useful insights that enable the government to implement more focused policies and initiatives by utilizing AI-powered business intelligence (Ramachandaran et al., 2025; *Sarawak Digital Economy Blueprint 2030*, 2023).

### ***Defining the "Digital Sarawak" Ecosystem***

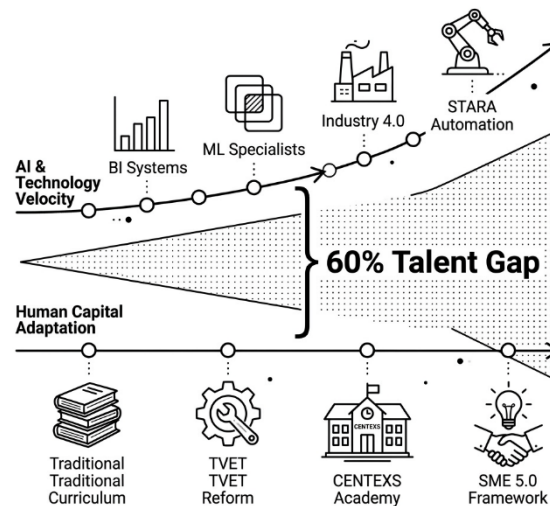
The transformation to a "Digital Sarawak" entails a paradigm change in which data becomes an essential resource. However, the existence of external enablers such as "public-private infrastructure partnerships" and "sector-specific pilot programs" is essential to going beyond a stage of mere awareness toward actual implementation, as stated in the Enablers and Barriers to AI Adoption in Regional SMEs report. This means that Kuching's success hinges on getting past the conceptual stage and creating an ecosystem in which government agencies and SMEs actively work together to close the gap between automated, AI-augmented workflows and legacy paper-based procedures. The goal of this digital ecosystem is to provide a unified setting where technology is a daily norm for both trade and governance rather than an isolated experiment.

## THE HUMAN CAPITAL PARADOX

A significant dilemma arises from the shift to an AI-driven economy: whereas technology is supposed to propel Sarawak's future development, its successful execution depends solely on the preparedness of the human labor force. This "Human Capital Paradox" contends that human-centric skills like strategic oversight, moral discernment, and innovative problem-solving become increasingly important to the organizational structure as technology advances.

### *The Skill Gap Reality*

A significant barrier to Sarawak's digital ambitions is the acute disconnect between the rapid, "fast-paced" evolution of AI and the slower adaptation cycle of traditional education and Technical and Vocational Education and Training (TVET) curricula. According to the MDEC (2024), the demand for specialized AI talent, such as data scientists and machine learning specialists, outstrips the current local supply by a staggering 60%. This talent deficit is rooted in a curricula mismatch where many computer science and IT programs focus on theoretical knowledge rather than the hands-on, practical skills required to manage AI-driven business intelligence systems (Ramachandaran et al., 2025). Figure 3 visualizes the growing disconnect between technological advancement and human capital readiness.



Source: MDEC 2024 | WEF 2023 | Sarawak Digital Economy Blueprint 2030

FIGURE 3. *Talent Gap*

It depicts a 60% Talent Gap caused by the "velocity" of AI and technology (including Industry 4.0 and machine learning) moving faster than the rate of human capital adaptation. The figure suggests that traditional curricula and TVET reforms are currently lagging behind the practical skills needed for modern AI-driven business intelligence systems.

Furthermore, the APEC Closing the Digital Skills Gap Report indicates that 75% of respondents identified a significant skills mismatch in the region, noting that government and educational agencies often have a weak understanding of the evolving digital landscape. This mismatch is exacerbated by "brain drain," where skilled professionals are lured away from local industries to higher-wage developed economies, leaving Sarawakian SMEs and government initiatives struggling to source local expertise. To address this, the Sarawak Government has established the CENTEXS Digital Academy to provide industry-relevant

training in frontier technologies like 5G and Industry 4.0, aiming to upskill a workforce that remains "industry-ready" despite technological turbulence (Azizi Othman, 2025; Ramachandaran et al., 2025; *Sarawak Digital Economy Blueprint 2030*, 2023).

### ***The Threat of Displacement vs. Opportunities for Growth***

The public is understandably concerned about job security as a result of the shift toward AI and automation; this worry is commonly referred to as STARA (Smart Technology, Artificial Intelligence, Robotics, and Algorithms) awareness (Nguyen, 2025). This concern is well-founded. According to worldwide trends reported by the WEF (2023), the division of labor between people and robots may result in the loss of 85 million jobs by 2025. Roles involving routine, repetitive work are the most vulnerable in Malaysian and regional SMEs (*Sarawak Digital Economy Blueprint 2030*, 2023).

AI-powered applications can efficiently automate tasks like scheduling, routine data entry, and simple customer service questions, claim Islam et al. (2025). AI is progressively streamlining manual labor and inventory management in labor-intensive industries like manufacturing, which is causing organizational opposition among workers who see automation as a direct threat to their livelihood. For smaller businesses that lack the management commitment to support staff during the shift, this impression can show itself as passive resistance or a lack of trust in automated technologies, which impedes the digital transformation process (Boonmee et al., 2025; Ramachandaran et al., 2025).

Sarawak has to change the narrative from replacement to enhancement in order to tackle this issue. AI should be viewed as a socioeconomic catalyst intended to supplement human effort and boost production rather than as a replacement for human labor. AI algorithms are excellent at quickly and accurately identifying patterns in large datasets, but they lack the "emotions and experimental aspects" that distinguish human intelligence (Islam et al., 2025; Ramachandaran et al., 2025; *Sarawak Digital Economy Blueprint 2030*, 2023).

The idea of augmentation highlights how AI can do dangerous and repetitive duties, including regular administrative filing or hazardous industrial procedures, freeing up human workers to work on more strategic, creative, and valuable projects. Value generation in AI projects is closely linked to employee involvement, according to Islam et al. (2025) the technology is only useful when people are given the authority to use AI-generated insights for decision-making. Additionally, human oversight is still an essential component of AI governance, especially when it comes to algorithmic responsibility, ethical issues, and data privacy compliance under the Personal Data Protection Act (PDPA). Sarawak can guarantee that its workforce continues to be the master of the machine by emphasizing a "human-centric" approach, as demonstrated by the SME 5.0 framework, and using AI to improve living standards and reach the high-income status envisioned in Post COVID-19 Development Strategy 2030 (2021)(Azizi Othman, 2025; Boonmee et al., 2025; Islam et al., 2025).

## **THE "BOOTCAMP" ERA**

The Fourth Industrial Revolution's (4IR) quick start has drastically changed Sarawak's educational environment. The state has entered a "Bootcamp" era, characterized by quick, intense, and industry-aligned training intended to generate a workforce capable of navigating an AI-driven economy, as traditional academic systems struggle to keep up with technological turmoil. This change acknowledges that nimble people with specific, provable technical skills rather than merely general theoretical knowledge are needed in the current digital economy

(Boonmee et al., 2025; *Sarawak Digital Economy Blueprint 2030*, 2023). Figure 4 compares the durability of various skill types across the history of industrial revolutions.

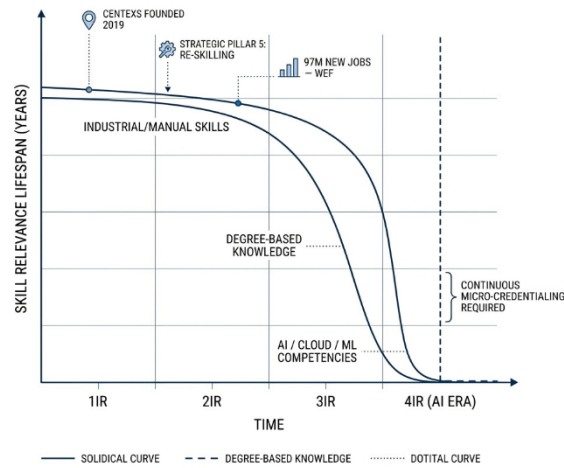


FIGURE 4. *Skill Relevance Lifespan*

The chart demonstrates that while manual skills and degree-based knowledge had long lifespans in earlier eras, the relevance of **AI, cloud, and ML competencies** declines rapidly in the Fourth Industrial Revolution (4IR). This necessitates a shift toward **continuous micro-credentialing** rather than relying solely on a one-time graduation.

### ***Beyond Conventional Degrees***

Organizations like the Centre for Technology Excellence Sarawak (CENTEXS) Digital Academy are at the forefront of this educational shift. Established in 2019, CENTEXS has moved away from the conventional degree-based model toward a system of "skill-based" certifications that prioritize industry readiness. This transition is anchored in strategic partnerships with global technology leaders such as Huawei, Microsoft, Bosch Rexroth, EON Reality, and IBM to ensure that training curricula are developed in accordance with real-world industry standards (*Sarawak Digital Economy Blueprint 2030*, 2023).

According to the *Sarawak Digital Economy Blueprint 2030* (2023), 100% Industry Certified Training and the issue of micro-credential certifications are the goals of the academy's cooperation approach. For instance, the cooperation with Microsoft prioritizes data science and cybersecurity, while the partnership with Huawei produced Southeast Asia's first digital laboratory focusing on 5G and telecoms gear. CENTEXS is assisting in the development of a "pipeline of job-ready graduates" who can instantly contribute to the RM56.4 billion digital economy target by concentrating on these particular domains.

### ***From Graduation to Micro-credentialing***

The idea of "graduation" is no longer the end of one's education in an AI-powered world. AI, machine learning, and cloud computing abilities have shorter lifespans than earlier industrial

competencies due to the quick speed of technological progress. As a result, continuing education has emerged as a strategic requirement for long-term professional success. Ramachandaran et al. (2025) claim that internal capability development is now a "continuous effort" due to the underutilization of sophisticated AI technologies in the absence of a workforce that continuously refreshes its expertise (*Sarawak Digital Economy Blueprint 2030, 2023*).

Sarawak Digital Economy Blueprint 2030 (2023) promotes a culture of ongoing micro-credentialing in order to remedy this. The "industry-focused re-skilling and up-skilling of the existing workforce" through modular training programs is the specific focus of Strategic Pillar 5 of the strategy. Without going back to a conventional four-year university program, this method enables workers to gain specialized new skills like AI-driven forensics or immersive simulation learning. Sarawakians will be able to take part in the 97 million new jobs that are being created worldwide as a result of the new division of labor between people and robots thanks to this modularity.

### ***Addressing Digital Literacy across Generations***

The cultural and digital divide that affects elder generations and rural workers moving to metropolitan areas like Kuching is a major obstacle in this transformation. These groups frequently encounter major obstacles pertaining to language and fundamental internet literacy. For example, many rural migrants may find the language and technical barrier to high-paying jobs insurmountable without targeted intervention, even though the state encourages STEM education in English to ensure global competitiveness (Boonmee et al., 2025; *Post COVID-19 Development Strategy 2030, 2021*; *Sarawak Digital Economy Blueprint 2030, 2023*).

To mitigate these disparities, the Sarawak Government has established 45 Digital Community Centres (DCC) and over 133 PEDis (Pusat Ekonomi Digital) in rural and semi-urban areas. These centers serve as focal points for the Community Digital Literacy Programme, which aims to reduce the "information gaps" and "fear of job displacement" that often cause organizational and cultural resistance to AI. Furthermore, many SME managers in regional contexts exhibit a conservative "risk-avoidance" culture, which can lead to the dismissal of AI as inapplicable to their traditional operations. Addressing these cultural nuances requires more than hardware; it demands a "human-centric" approach that builds confidence and digital ability across all age groups and geographic locations (Azizi Othman, 2025; Boonmee et al., 2025; *Sarawak Digital Economy Blueprint 2030, 2023*).

## **THE ENGINE OF THE ECONOMY**

Sarawak's economy is built on small and medium-sized enterprises (SMEs), which make up the great majority of operating businesses and play a crucial role in social development and employment. The Sarawak government wants 80% of MSMEs to be digitalized by 2030 in order to meet the objectives of the Post COVID-19 Development Strategy 2030 (2021). However, local SMEs frequently fall behind as big multinational firms use artificial intelligence (AI) to gain a competitive edge, creating a digital divide that could worsen economic inequality (Azizi Othman, 2025; Islam et al., 2025; Ramachandaran et al., 2025; *Sarawak Digital Economy Blueprint 2030, 2023*)

## The Digitization Struggle

Deeply ingrained structural obstacles make the shift to AI difficult for many SMEs in Kuching. The biggest obstacle is capital restrictions; implementing AI necessitates a large upfront investment in software licensing, hardware (like GPUs), and specialist human expenditures, which are sometimes unaffordable for resource-constrained businesses with narrow profit margins. Cost concerns prevented 68% of SME respondents from investing in AI, according to a poll conducted by the ASEAN Business Council in 2022 (Azizi Othman, 2025).

Additionally, SMEs are unable to manage complicated AI systems due to a severe lack of technical knowledge. The local supply of data scientists and machine learning engineers is significantly less than the demand, which is made worse by "brain drain" the migration of qualified workers to established economies with greater wages. Lastly, a lot of well-established SMEs continue to rely on paper-based procedures and outdated systems. According to Azizi Othman (2025), these antiquated infrastructures frequently provide fragmented, low-quality data that is incompatible with contemporary AI standards. According to Ramachandaran et al. (2025), the cost of maintaining these antiquated systems keeps insurers and small businesses in a "technological status quo," which keeps them from utilizing AI to its fullest.

### A Phased Roadmap

Adoption of AI should be a gradual process of incremental innovation rather than a drastic, all-at-once change in order to reduce the risks of failure. Islam et al. (2025) claim that this two-pronged strategy, which strikes a balance between operational improvement and structural renewal, enables businesses to change while being receptive to strategic reinvention. Figure 5 provides a three-step strategic framework for small and medium-sized enterprises (SMEs) to adopt AI.

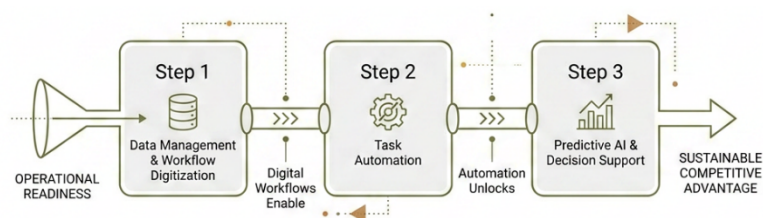


FIGURE 5. *Phased Roadmap*

The roadmap begins with Step 1: Data Management & Workflow Digitization to establish operational readiness. It proceeds to Step 2: Task Automation, which unlocks efficiency by reducing manual labor. The final stage, Step 3: Predictive AI & Decision Support, enables firms to use advanced analytics for a sustainable competitive advantage. In order to ensure that technology is a tool for improvement rather than a cause of organizational upheaval, table 1 outlines a methodical evolution for SMEs.

TABLE 1. *Phase Roadmap Rationale*

Phase	AI Adoption Stage	Rationale
1	Data Management and Workflow Digitization	Successful AI adoption must begin with operational readiness. Boonmee et al. (2025), standardizing internal workflows and documentation is the highest priority for SMEs, as AI-generated insights can only

		be effectively utilized if a stable process foundation exists.
2	Task Automation	Once digital workflows are in place, SMEs can implement AI to automate repetitive, routine tasks such as scheduling, report generation, and basic customer service inquiries. This reduces manual labor and frees up employees for more strategic, creative, and value-added work (Islam et al., 2025).
3	Predictive AI/Decision Support	In the final stage, firms can leverage advanced tools like predictive analytics to forecast market trends, personalize marketing campaigns, and support data-driven decision-making. This enables Kuching-based SMEs to respond swiftly to dynamic market demands and achieve sustainable competitive advantage (Islam et al., 2025; Ramachandaran et al., 2025).

To put it simply, Sarawak's SMEs may adopt AI through a three-step process that strikes a compromise between worker stability and technical advancement. By digitizing internal workflows, it first builds operational readiness and establishes a solid data basis for upcoming solutions. When task automation is available, businesses switch from manual labor to strategic and creative work by automating repetitive tasks. In order to ensure that technology serves as a tool for human augmentation rather than replacement, this stepwise strategy culminates in the application of predictive AI for data-driven decision-making, ultimately assisting local firms in gaining a sustainable competitive advantage in accordance with the state's 2030 goals.

### ***Industry-Academia Partnerships***

Overcoming the human capital paradox requires a collaborative model that bridges the gap between traditional curricula and practical industry needs. Industry-academia partnerships are essential; firms provide real-world problems for students and researchers to solve, while the academic side provides the technical solutions and a pipeline of job-ready talent (Ramachandaran et al., 2025).

The Sarawak Government facilitates this through the Industry Linkage Fund, a matching grant scheme designed to support translational research and innovation in partnership between public and private sectors. Additionally, the Digital Innovation Clusters and innovation hubs established across Sarawak serve as platforms where universities and entrepreneurs can accelerate product development and commercialization. According to the Sarawak Digital Economy Blueprint 2030 (2023), these strategic alliances equip SMEs with the "AI expertise and best practices" necessary to compete in a globalized marketplace, ensuring that the local workforce remains the master of the machine (Ramachandaran et al., 2025).

## **ETHICAL AND SOCIETAL CONSIDERATIONS**

As Sarawak pivots toward an AI-driven economy, the technological shift introduces complex ethical and societal challenges that extend beyond simple infrastructure deployment. The state's vision for a thriving society by 2030 is anchored on the principle that digital transformation must be inclusive and sustainable, ensuring that the integration of Artificial Intelligence (AI) does not compromise the rights or well-being of the population. Figure 6 maps the ethical, legal, and social challenges Sarawak must navigate during its digital transformation.

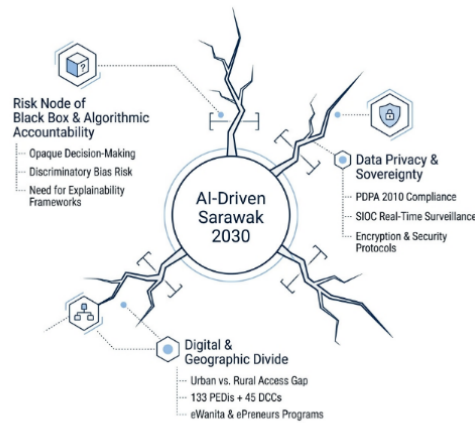


FIGURE 6. *AI-Driven Sarawak 2030*

The diagram identifies critical "risk nodes," such as the "Black Box" Problem (algorithmic accountability), Data Privacy & Sovereignty (compliance with the PDPA (2010)), and the Digital & Geographic Divide (the gap between urban and rural access). It emphasizes that programs like PEDis and Digital Community Centres are essential to ensure the transition is inclusive.

### ***The "Black Box" Problem and Algorithmic Accountability***

The "Black Box" problem, or the lack of transparency in how sophisticated algorithms arrive at particular conclusions or predictions, is a major ethical concern in the adoption of AI. To prevent algorithmic bias and system dependency, Sarawakian personnel must comprehend the reasoning behind AI-driven results. Businesses should aim for transparency in AI development and implementation, according to Islam et al. (2025), in order to boost public trust and allay concerns about decision-making fairness.

Workers run the risk of replacing human oversight with mindless adherence to machine logic if they are not trained to properly assess AI-generated insights. This is especially risky in industries like banking and insurance, where discriminatory actions could result from distorted data. To lower perceived liability concerns and guarantee that AI stays a tool for human enhancement rather than an opaque authority, Ramachandaran et al. (2025) claim that a thorough algorithmic governance structure addressing transparency and explainability is required (Azizi Othman, 2025).

### ***Data Privacy in the Borneo Context***

The Sarawak Integrated Operation Centre (SIOC) and the Kuching Smart City Master Plan are two examples of the initiatives aimed at creating a Smart Sarawak that need gathering enormous amounts of data from the populace. In this situation, safeguarding digital rights is crucial. Strategic Pillar 5 of the Sarawak Digital Economy Blueprint 2030 expressly names "Data Governance" as a major factor in digital preparedness, highlighting the necessity of controlling data availability, usability, and security to avoid abuse (*Sarawak Digital Economy Blueprint 2030, 2023*)

The main legal framework in Malaysia is the PDPA (2010) which mandates that data be used only for certain, lawful reasons and requires express agreement from individuals. However, the complexity of guaranteeing data security and sovereignty rises as the state employs round-the-clock real-time monitoring through systems like SIOC. Strong security procedures and encryption are necessary to navigate this environment, according to Ramachandaran et al. (2025), in order to uphold client confidence and adhere to strict regulatory requirements like Bank Negara Malaysia's RMiT framework.

### ***Bridging the Digital and Geographic Divide***

A central tenet of the Post COVID-19 Development Strategy (PCDS) 2030 is ensuring that the AI boom benefits all Sarawakians, not just the urban elite in Kuching. One of the seven strategic thrusts of PCDS 2030 is Social Inclusivity, which aims to narrow the developmental gaps between urban and rural areas. According to the Sarawak Government, digital transformation should act as a catalyst to uplift the socio-economic status of the "impoverished segment of the population" by providing equitable access to jobs and business opportunities (*Post COVID-19 Development Strategy 2030*, 2021).

In order to accomplish this, the state has set up programs like 133 PEDis and 45 Digital Community Centers (DCC) to train rural populations in digital literacy and skills. Additionally, initiatives like eWanita and ePreneurs especially target underprivileged populations to make sure they are ready for the demands of a market that is technologically savvy. Boonmee et al. (2025) claim that this human-centered strategy is consistent with the Industry 5.0 paradigm, which emphasizes that digital transformation should promote equitable economic growth rather than favoring those who are already well-prepared. Sarawak hopes to reduce its GINI index and guarantee that technological prowess translates into higher living standards for all communities by emphasizing inclusive digital involvement (*Sarawak Digital Economy Blueprint 2030*, 2023).

## **RECOMMENDATIONS FOR POLICY**

The challenges noted in the earlier sections such as severe skill shortages, organizational resistance, and deficiencies in data infrastructure are translated into practical policy levers in this part. The objective is to give industry players and the Sarawak government a strategic framework to hasten the adoption of artificial intelligence (AI) while guaranteeing that the shift stays human-centric and economically inclusive (Azizi Othman, 2025; Ramachandaran et al., 2025).

### ***Incentivizing Digital Maturity in SMEs***

Despite being the backbone of Sarawak's economy, small and medium-sized businesses (SMEs) have the biggest challenges in the digital transformation. Policy must go beyond general awareness to address the unique structural limitations of local businesses in order to meet the PCDS 2030 goal of 80% MSME digitalization (Boonmee et al., 2025; *Sarawak Digital Economy Blueprint 2030*, 2023).

The "technological status quo" brought about by a lack of funding to re-engineer outdated systems is a major obstacle for Kuching-based SMEs. According to Islam et al. (2025), 68% of SME respondents in regional studies cited cost concerns as the primary deterrent to AI adoption. Many well-established SMEs continue to use antiquated, disjointed, or paper-based

IT infrastructures that date back decades. For businesses with narrow profit margins, the expense of integration or a complete system redesign is expensive because these systems are often incompatible with contemporary AI requirements (Azizi Othman, 2025; Ramachandaran et al., 2025).

A "Digital Transformation Grant" that is particularly designated for the technical audit and upgrading of legacy IT infrastructure should be implemented by the Sarawakian government. Although digitalization grants and vouchers are mentioned in the current Sarawak Digital Economy Blueprint 2030 (2023), this new tool ought to be more specific. A "one-size-fits-all" approach to funding is inadequate, according to Boonmee et al. (2025) instead, policy should offer customized subsidies for infrastructure audits and diagnostic tools that assist SMEs in identifying their unique readiness deficiencies.

In order to match public funding with successful adoption outcomes, lead agencies like MINTRED and SDEC might oversee this fund through a risk-sharing structure in which the government co-invests in implementation. Access to "AI starter kits" subsidized cloud-based AI tools and data management systems that lower the entrance hurdle for businesses with limited resources should also be made easier by this funding (Azizi Othman, 2025; Boonmee et al., 2025; *Sarawak Digital Economy Blueprint 2030*, 2023).

Funding the "middle-ware" and data-cleaning procedures required for AI preparedness must take precedence over the acquisition of high-tech hardware. Boonmee et al. (2025) claim that "Process" maturity, rather than just technology availability, is a more important factor in AI adoption. When policy interventions ignore the underlying data quality in favor of a "superficial embrace" of hardware, they frequently fall short (Azizi Othman, 2025; Islam et al., 2025).

Therefore, the following should be given priority in the Digital Transformation Grant:

- Funding for the transformation of unstructured legacy data into machine-readable formats appropriate for AI training is known as data cleansing and standardization (Azizi Othman, 2025; Boonmee et al., 2025).
- Supporting the creation of software layers that enable new AI modules to interact with current legacy systems, interoperability middleware lessens the requirement for complete infrastructure replacement (Azizi Othman, 2025; Boonmee et al., 2025).
- Grants should support the creation of Standard Operating Procedures (SOPs) and organized documentation in accordance with the SME 5.0 paradigm, since AI-generated insights are only useful when integrated into reliable human workflows (Boonmee et al., 2025).

### ***Establishing a "Human-in-the-Loop" Workforce Pipeline***

The Sarawak digital shift is mostly a human-centric activity, even though infrastructure and capital are crucial. Policy must shift from classroom-based learning to immersive, industry-integrated talent development in order to close the growing gap between technological competence and workforce preparation.

The industry's adoption of AI is outpacing the present supply of specialized technical personnel. The demand for data scientists and AI specialists in Malaysia exceeds the local supply by about 60%, according to the Malaysia Digital Economy Corporation (MDEC) (2024). There are two main causes of this deficit. First, there is a clear disconnect between the

"fast-paced" practical requirements of firms using AI-driven business intelligence and traditional university/TVET curriculum, which frequently place an emphasis on theoretical understanding. Second, local SMEs and insurers are finding it difficult to obtain the knowledge required for long-term digital transformation as a result of the "brain drain" problem, which continues to attract competent Malaysian-trained individuals to higher-wage industrialized nations (Azizi Othman, 2025; Ramachandaran et al., 2025).

By creating a "National AI Apprenticeship" program, the Sarawak government should broaden the scope of organizations such as the Centre for Technology Excellence Sarawak (CENTEXS). This project would establish a framework for subsidized on-the-job training that would go beyond the academy's current lab-based teaching, such as its relationships with Microsoft and Huawei (*Sarawak Digital Economy Blueprint 2030*, 2023).

Under this idea, local companies hiring student apprentices in AI roles would receive training vouchers or wage subsidies from the government. According to Boonmee et al. (2025), this "dual-track" approach lowers the financial risk for companies looking to develop internal technical capability while fostering "operational muscle" by enabling students to apply cutting-edge technologies to actual business situations. Sarawak may establish a long-term pipeline of "industry-ready" graduates with verified experience in regional organizational contexts by combining this with the current Industry Linkage Fund.

The focus of legislation must change to micro-credentialing pathways that prioritize AI ethics and "Human-in-the-Loop" (HITL) management in order to guarantee that AI stays a tool for augmentation rather than a cause of displacement. The Sarawak Digital Economy Blueprint 2030 states that skills development should emphasize the "ethical deployment" of AI in both the public and private sectors in addition to coding (*Sarawak Digital Economy Blueprint 2030*, 2023).

To avoid the "Black Box" issue, in which opaque algorithms may result in biased or discriminatory outputs, graduates must be prepared to audit AI judgments. Encouraging micro-credentials in algorithmic governance and ethical data management that are in line with the Personal Data Protection Act (PDPA) will guarantee that workers can offer the strategic supervision and innovative problem-solving that AI systems are unable to. Sarawak may guarantee that its digital economy is driven by mechanisms that continue to be transparent, accountable, and essentially in line with human values by certifying employees as HITL managers (Azizi Othman, 2025; Boonmee et al., 2025; Islam et al., 2025; Nguyen, 2025; Ramachandaran et al., 2025).

### ***Strengthening Industry-Academia Collaboration***

Bridging the functional gap between academic research and the realities of business operations is the third strategic pillar for increasing the deployment of AI in Sarawak. Although Sarawak has laid the groundwork for digital research, a more comprehensive strategy is needed to guarantee that technological innovation results in quantifiable increases in productivity for regional businesses.

One of the key issues mentioned in the sources is that academic research frequently stays isolated from the real-world, day-to-day operational difficulties that local businesses encounter. Even when partnerships do exist, Ramachandaran et al. (2025) claim that they frequently fall short of providing the instant "hands-on skills" required to develop and oversee AI-powered systems in high-stakes settings like the manufacturing or insurance industries. Additionally, Boonmee et al. (2025) highlight a major gap in regional contexts where national AI initiatives

frequently fall short of providing local SMEs with practical help, especially those in traditional industries with low levels of digital maturity like agriculture or handicrafts. Research produced by this compartmentalized strategy is theoretically solid but operationally useless for companies with limited resources that are having trouble with aging infrastructure.

The Sarawak government should establish "Regional AI Sandboxes" specialized, industry-specific settings where the government supports direct partnerships between academics and SMEs to overcome this mismatch. Boonmee et al. (2025) claim that these sandboxes enable SMEs to test AI tools in a low-risk, economical setting, hence "de-risking" the investment through pilot projects and professional oversight.

The Center of Excellence (CoE) for Digital Economy, which was founded to do translational research in collaboration with top international and Sarawakian universities, should be expanded upon by this effort. The state can create an ecosystem where businesses supply real-world issues (such supply chain inefficiencies or agricultural yield prediction) and students supply the technical answers by localizing these CoEs into "sandboxes" within industrial zones or rural digital clusters. The Sarawak Digital Economy Blueprint 2030 (2023) states that the business Linkage Fund, a matching grant program created especially to speed commercialization and improve business competitiveness in the global economy, should encourage these partnerships.

The creation of public-private infrastructure partnerships must be an essential feature of these sandboxes. The hefty initial expenses of cloud storage and hardware discourage many small businesses. By giving SMEs access to professional consultation and shared cloud computing resources, policy should lower the "barrier to entry." Sarawak Digital Economy Blueprint 2030 (2023) claim that infrastructure co-investment programs, such AI-as-a-service (AIaaS) platforms or subsidized cloud storage, can offer the "economies of scale" that individual small businesses are unable to obtain on their own.

Additionally, the state ought to broaden programs like the "Go Digital Consultancy Program" to incorporate diagnostic tools tailored to artificial intelligence. The Sarawak Digital Economy Blueprint 2030 (2023) states that offering structured training and consulting funding guarantees that SMEs integrate AI-generated insights into their fundamental business models rather than merely "superficially embrace" technology. Sarawak may develop a distinctive model for "Industry 5.0" ready by fusing academic knowledge with shared digital infrastructure, guaranteeing that its workforce continues to be the master of the machine while promoting sustainable economic growth.

### ***Data Governance and Ethical Oversight***

The ethical implications of massive data processing must be taken into consideration as Sarawak expands its digital aspirations, especially through the development of smart city infrastructure. To guarantee that Artificial Intelligence (AI) is a tool for the public good rather than a source of systemic prejudice or privacy infringement, a strong governance framework must be established.

The risk of data mismanagement and algorithmic bias rises dramatically as Kuching expands its Smart City projects, which are centralized through the Sarawak Integrated Operation Centre (SIOC). Large volumes of citizen data are gathered by current systems for emergency response, traffic control, and surveillance. However, the "Black Box" issue in which opaque algorithms may result in biased decisions in delicate areas like public safety or financial services remains a serious threat, as observed by Ramachandaran et al. (2025). Additionally, a

large number of the region's current datasets are incomplete or of low quality, which may result in faulty AI-driven insights that disproportionately impact underprivileged people.

In order to reduce these hazards, the Sarawak government ought to create a "Sarawak AI Ethics Council." In order to guarantee openness, responsibility, and inclusivity, this organization would be in charge of supervising the implementation of all AI algorithms in the public sector. This specialized ethics organization would carry out required effect evaluations for AI projects, building on the current governance framework of the Sarawak Multimedia Authority (SMA) and the proposed Cyber Security Council. The Sarawak Digital Economy Blueprint 2030 (2023) states that a "cyber secure and ethical digital environment" requires the ethical use of technology. As the ultimate arbiter of algorithmic transparency, the Council would make sure that "Human-in-the-Loop" (HITL) standards are adhered to in order to preserve human control over machine judgments.

This Council's main goal must be to create precise data privacy regulations that meet local community requirements and national standards. Specifically, Sarawak's AI policies must be integrated with the PDPA (2010), ensuring that express consent and purpose limitation remain the foundation of all data collection. Islam et al. (2025) claim that if openness is not given priority, societal opposition may result from public concerns about job displacement and safety issues.

Consequently, the Council ought to:

- Localize Data Protection: Create Policy, Procedure, and Guidelines (PPGs) unique to Sarawak that convert national PDPA obligations into practical actions for regional government agencies and SMEs.
- Create Algorithmic Audits: In line with the Industry 5.0 paradigm of human-centricity, conduct routine audits of public AI systems to identify and address algorithmic bias.
- Boost Public Trust: Promote public trust by making the use of AI transparent and establishing channels for citizens to challenge choices made by AI.

Sarawak can guarantee that its high-tech capabilities create a digital society marked by justice, security, and mutual trust by striking a balance between strict data control and the distinct sociocultural background of the area.

## CONCLUSION

Technology is only as good as the people who use it, as Sarawak's transition to an AI-driven economy demonstrates. Boonmee et al. (2025) assert that technology tools only produce value when they are integrated into a framework of strategic leadership and human-centric workflows. The development of an agile, "industry-ready" workforce is what will ultimately determine the Post COVID-19 Development Strategy 2030 (2021)'s success, not the purchase of technology. It will need a team effort to realize this vision. To guarantee an ethical digital environment, policymakers must establish data governance frameworks and legislative clarity. To overcome opposition to automation, business leaders must place a high priority on employee engagement and incremental innovation. Lastly, in order to stay competitive, students need to embrace the "bootcamp era" by pursuing ongoing micro-credentialing and STEM education. Advantage: Sarawak may lead the way in developing a distinctive model for digital transformation by fusing its rich cultural legacy and biodiversity with high-tech capabilities demonstrated in programs like AI-driven forest preservation. In addition to being technologically sophisticated, this strategy guarantees that Sarawak's future will be sustainable, inclusive, and essentially human-friendly (Azizi Othman, 2025; Islam et al., 2025; Nguyen, 2025; *Sarawak Digital Economy Blueprint 2030*, 2023).

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RESEARCH NOTE

## Enhancing Cybersecurity Compliance: A Multi-Dimensional Analysis of Sarawak Security and Enforcement Unit (SSEU)

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### ABSTRACT

*The increasing digitalization of governmental operations has heightened cybersecurity risks, emphasizing the need for robust compliance frameworks to protect sensitive information. While the Sarawak Government ICT Security Policy (Dasar Keselamatan ICT Kerajaan Negeri Sarawak Bil. 1/2012) addresses these challenges, significant compliance disparities persist across hierarchical levels within the Sarawak Security and Enforcement Unit (SSEU). This study evaluates cybersecurity compliance levels, identifies barriers and proposes hierarchical-level-specific strategies to address gaps in cybersecurity compliance within the SSEU. Using a quantitative research design and stratified random sampling, data was collected from SSEU employees across four hierarchical levels via structured digital questionnaires were evaluated using descriptive and inferential statistical approaches including ANOVA and regression analysis. Results revealed that top management exhibited the highest compliance levels due to greater awareness and training, whereas operational groups (AKP1 and AKP2) faced challenges such as insufficient training, weak enforcement mechanisms and time constraints that highlighting systemic gaps in resource allocation and policy dissemination. Addressing these gaps requires targeted training programs, stronger enforcement mechanisms and strategic leadership support to enhance cybersecurity practices across all organizational levels. Future work should include qualitative exploration of employee behavior and organizational culture, as well as the development of advanced diagnostic tools for real-time compliance monitoring.*

**Keywords**— Cybersecurity compliance; Sarawak ICT Security Policy; organizational hierarchies; cybersecurity awareness; policy enforcement

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## INTRODUCTION

### *Background Study*

The increasing reliance on digital technologies in governmental operations has heightened the need for strong cybersecurity safeguards to safeguard sensitive data and maintain operational continuity. As governmental agencies adopt advanced information and communication technologies (ICT) to enhance efficiency and service delivery, they become increasingly vulnerable to evolving cyber threats. Cybersecurity breaches can compromise the confidentiality, integrity and availability of critical data, resulting in severe consequences for public safety and service reliability. Effective cybersecurity strategies must be innovative and adaptable to evolving threats, utilizing the latest technologies and fostering cross-sector collaboration. This underscores the critical need for comprehensive cybersecurity policies that are not only well-designed but also effectively implemented. Effective cybersecurity strategies must be innovative and adaptable to evolving threats, utilizing the latest technologies and fostering cross-sector collaboration (Sendjaja *et al.*, 2024). Public organizations should enhance cybersecurity awareness across all functional areas, ensuring that tactical and operational teams are well-prepared to implement security measures (Dominguez-Dorado *et al.*, 2023). Cybersecurity, therefore, emerges as a fundamental component in protecting critical information systems against unauthorized access, breaches, and cyberattacks.

The state of Sarawak, Malaysia has recognized the importance of cybersecurity in safeguarding its digital infrastructure. In response, the Sarawak Government introduced *Dasar Keselamatan ICT Kerajaan Negeri Sarawak Bil. 1/2012* (Sarawak Government ICT Security Policy). This policy is a strategic guideline designed to address cybersecurity risks by providing a comprehensive framework for ensuring the secure use of information and communication technologies (ICT) within state agencies. It outlines key principles, including user responsibilities, system security requirements and mechanisms for monitoring compliance to mitigate cybersecurity risks. Establishing robust legal frameworks is essential for protecting the information sphere from cyberattacks, aligning national legislation with international standards (Skrypniuk *et al.*, 2024).

Despite the existence of this policy, challenges persist in ensuring that all personnel across different hierarchical levels fully understand and adhere to the prescribed standards. Many personnel lack a comprehensive understanding of cybersecurity policies, which can lead to unintentional breaches (Sarmoen *et al.*, 2019). The Sarawak Security and Enforcement Unit (SSEU) serves as a vital arm of the state government, tasked with maintaining public safety and enforcing regulatory compliance. Given its role, SSEU relies heavily on ICT systems to manage operations and coordinate activities efficiently. This dependence underscores the importance of strict adherence to cybersecurity policies to protect sensitive data and ensure uninterrupted functionality. However, the multi-tiered structure of SSEU with roles ranging from strategic oversight at the top to hands-on operational implementation creates potential disparities in compliance levels. SSEU, a key government agency tasked with maintaining public safety and regulatory enforcement exemplifies these challenges. While top management demonstrates alignment with strategic compliance objectives, operational groups often face barriers such as limited awareness, insufficient training, and resource constraints, resulting in varying levels of adherence.

Cybersecurity compliance does not serve as a universal solution; instead, it requires tailored approaches that account for varying roles, responsibilities and technical proficiencies

within an organization. Operational teams often face budgetary and resource limitations, hindering their ability to implement necessary security measures (Sarmoen *et al.*, 2019). For example, senior management may focus on strategic decision-making without delving into the operational intricacies of cybersecurity, whereas frontline staff might lack the resources or training needed to implement secure practices effectively. Effective management principles are crucial for implementing internal social policies within organizations. A structured approach to management can enhance policy enforcement by ensuring that all levels of the organization are aligned with the policy objectives.

Globally, similar trends have been observed, where gaps in cybersecurity compliance arise due to a lack of alignment between policy frameworks and the realities of organizational practices. These gaps often stem from factors such as limited training, insufficient enforcement or a lack of resources dedicated to cybersecurity initiatives. Regular training programs are crucial; without them, employees may not recognize the importance of compliance (Sarmoen *et al.*, 2019)(Ali, Dominic and Ali, 2020). In the context of Sarawak, it is crucial to examine how such factors play out within SSEU and to identify ways to bridge these compliance gaps effectively. The fidelity of policy implementation is often compromised due to a lack of coherence and support from management. The adaptation of policies at lower levels can lead to discrepancies between intended and actual outcomes, highlighting the need for strong management support to bridge these gaps (Mitra, 2022). Information and analytical support play a vital role in the management of socio-economic and law enforcement activities. A comprehensive diagnostic approach can help identify issues and improve policy enforcement by providing a framework for effective decision-making (Zakhozhai, 2023).

Additionally, the advent of increasingly sophisticated cyber threats amplifies the need for proactive cybersecurity measures. Cybercriminals now employ advanced tactics, ranging from phishing and ransomware to state-sponsored cyberattacks, targeting governmental agencies for espionage or disruption. The evolving threat landscape makes it imperative for agencies like SSEU to not only comply with existing policies but to continuously adapt and enhance their cybersecurity practices. This study delves into the underlying factors that influence cybersecurity compliance within SSEU. By adopting a multi-dimensional perspective, it aims to capture the complexity of compliance dynamics and provide actionable insights. The study acknowledges that cybersecurity is more than just a technological problem but also a human and organizational one requiring a holistic approach to identify and address vulnerabilities effectively.

### ***Problem Statement***

Within the Sarawak State Enforcement Unit (SSEU), varying levels of compliance with the Sarawak Government ICT Security Policy (Dasar Keselamatan ICT Kerajaan Negeri Sarawak Bil. 1/2012) have been observed. These differences stem from disparities in roles, responsibilities, and access to resources across hierarchical levels. While top management tends to align with strategic cybersecurity requirements, operational groups encounter significant challenges. These include limited awareness, insufficient training, and inconsistent policy enforcement, which collectively compromise the agency's overall cybersecurity posture. Systemic issues further exacerbate these challenges, such as outdated technological infrastructure, inadequate resource allocation, and a lack of tailored strategies that address the unique needs of different organizational roles. These factors contribute to disparities in adherence to cybersecurity policies, increasing the vulnerability

of critical ICT systems to potential threats and weakening the resilience of governmental operations.

At present, there is no established framework capable of systematically identifying the root causes of cybersecurity compliance gaps within the Sarawak State Enforcement Unit (SSEU). While existing policies outline general requirements, they lack a structured approach to diagnose specific challenges faced by various organizational levels. This absence of a comprehensive framework hinders the ability to pinpoint factors such as resource disparities, role-based inconsistencies, and enforcement deficiencies that contribute to non-compliance. Without such a mechanism, efforts to address these issues remain fragmented and reactive, leaving critical ICT systems vulnerable to threats. Developing a robust diagnostic tool is therefore essential for improving compliance.

Investigating cybersecurity compliance within the Sarawak State Enforcement Unit (SSEU) is crucial to address existing challenges and improve the agency's overall cybersecurity posture. By understanding the root causes of compliance gaps, targeted strategies can be developed to address key issues, such as resource disparities, inadequate training, and inconsistent enforcement. This investigation will enable the design of tailored approaches that consider the unique roles and responsibilities within the organization, fostering a more cohesive and resilient cybersecurity framework. Ultimately, this effort will enhance the implementation of cybersecurity measures, reduce vulnerabilities, and strengthen the agency's ability to safeguard critical ICT systems.

## LITERATURE REVIEW

### *Overview of Cybersecurity Compliance*

Cybersecurity compliance has emerged as a pivotal element in ensuring organizational resilience, particularly within governmental frameworks where the security of critical information systems is paramount. Compliance entails adherence to established standards, regulations, and best practices designed to safeguard information and communication technologies (ICT) from a growing array of cyber threats. Compliance not only ensures regulatory adherence but also enhances an organization's capacity to address threats and rebound from security breaches. However, it presents challenges, including resource demands and the need for continuous updates to address evolving threats (Adebola Folorunso *et al.*, 2024a)(Ngozi Samuel Uzougbo, Chinonso Gladys Ikegwu and Adefolake Olachi Adewusi, 2024). The significance of cybersecurity compliance becomes even more pronounced in the context of public sector entities like the Sarawak Security and Enforcement Unit (SSEU), given their role in maintaining public trust and service continuity. While cybersecurity compliance is essential for protecting organizational assets, it is often perceived as a "check-the-box" activity, which may not fully address actual security needs. This perception can lead to gaps between regulatory adherence and effective security measures, emphasizing the importance of taking a proactive approach, risk-based approach to compliance management (Adebola Folorunso *et al.*, 2024a).

*Definition and Importance of Cybersecurity Compliance in Governmental Organizations:* In the realm of governmental operations, cybersecurity compliance can be defined as the structured adherence to specific policies, standards and frameworks designed to mitigate risks linked to data breaches, unauthorized access and various cyberattacks(Adebola Folorunso *et al.*,

2024a). Governments hold extensive sensitive data, encompassing personal citizen information, critical infrastructure blueprints and intelligence materials. In governmental organizations, compliance involves aligning with international standards like ISO/IEC 27001 and NIST, which provide a structured approach to managing information security (Magnusson, Dalipi and Elm, 2023). While cybersecurity compliance is essential for governmental organizations, it is not a panacea for all cybersecurity challenges. Compliance alone does not guarantee robust security, as it often focuses on meeting minimum standards rather than addressing all potential vulnerabilities. Organizations must adopt a proactive security strategy that goes beyond compliance to effectively counter the evolving threat landscape. This includes integrating risk-based approaches and leveraging automation to enhance compliance management and overall cybersecurity posture (Adebola Folorunso *et al.*, 2024a)(Madnick *et al.*, 2019).

A lack of compliance increases the risk of data breaches, undermines public confidence, and disrupts essential public services. As such, robust compliance mechanisms ensure operational integrity, resilience against cyber incidents and adherence to legal and ethical obligations. Effective cybersecurity compliance frameworks typically emphasize risk management, incident response planning and employee awareness to counter evolving threats (Adebola Folorunso *et al.*, 2024a)(Harris and Martin, 2019). By prioritizing compliance, governments also create a culture of proactive defence, ensuring their systems remain secure and resilient in the face of persistent cyber threats. For government agencies, compliance is crucial in establishing a resilient cybersecurity posture to protect public data and services from cyberattacks(Magnusson, Dalipi and Elm, 2023). Governmental organizations often face challenges in implementing cybersecurity measures due to complex bureaucratic processes and the need to align with various stakeholders (Alam, Ibrahim and Karas, 2024). Employee behaviour and awareness significantly impact compliance. Government social media (GSM) and organizational policies play a role in enhancing cybersecurity awareness and protective behaviours among employees (Tran *et al.*, 2024)(Tran *et al.*, 2024).

*Global Context: Cybersecurity Compliance in Protecting Governmental Operations:* On a global scale, cybersecurity compliance is widely acknowledged as a critical measure for securing governmental systems and operations. Modern governments are increasingly reliant on interconnected ICT infrastructures to deliver public services, ranging from healthcare and education to law enforcement and transportation. These systems, while enabling efficiency, are vulnerable to cyberattacks aimed at disrupting national security, stealing sensitive information or causing public disorder.

*Sarawak Context: The Role of the Sarawak Government ICT Security Policy:* The Sarawak Government ICT Security Policy plays a crucial role in safeguarding the state's digital infrastructure and ensuring the secure transition towards a digital economy. This policy is integral to the broader digital transformation efforts in Sarawak, which aim to enhance economic growth, improve governance and address urbanization challenges through technology. The policy's implementation is essential for protecting sensitive information and maintaining the integrity of digital services, which are vital for the state's socio-economic development. In Sarawak, Malaysia, cybersecurity compliance is anchored in the Sarawak Government ICT Security Policy (Dasar Keselamatan ICT Kerajaan Negeri Sarawak Bil. 1/2012). National Cyber Security Policy (NCSP) provides a framework for safeguarding critical national information infrastructure, which is relevant to Sarawak's efforts to secure its digital assets

(Fazlan, Nadia and Zahri, 2018). These policies serve as a comprehensive guide for public sector organizations, including the Sarawak Security and Enforcement Unit (SSEU) to secure their ICT infrastructures against a dynamic threat landscape.

The policy outlines structured guidelines addressing key areas such as access control, data protection, network security and incident response. Sarawak is undergoing a significant digital transformation, marked by initiatives like the Sarawak Digital Economy Strategy 2018–2022, which aims to modernize the state's economy and governance through technology (Goi, 2022). By aligning with these standards, public agencies in Sarawak can mitigate risks associated with cyberattacks and unauthorized access to sensitive information. As digital technologies become more prevalent, the risk of cyber threats increases. Effective ICT security policies are necessary to protect against unauthorized access, data breaches and other cyber threats that could disrupt services and harm the economy (Haris@Harib, Sarijan and Hussin, 2017a)(Fazlan, Nadia and Zahri, 2018).

The Sarawak Government ICT Security Policy also emphasizes employee training and awareness, recognizing that human error often serves as a critical vulnerability in cybersecurity breaches. The Sarawak Government ICT Security Policy supports the growth of e-commerce by ensuring a secure environment for online transactions. This is crucial for the adoption of e-commerce services, which are a key component of the state's digital economy strategy (Ahmad *et al.*, 2019)(Serojai, Ujir and Hipiny, 2021). For the SSEU, compliance with this policy ensures not only the security of its operations but also the protection of the public interest it serves. By embedding these measures into its operational framework, the SSEU exemplifies a proactive approach to addressing the region's cybersecurity challenges, thereby reinforcing trust in Sarawak's digital governance.

Moreover, Sarawak's commitment to ICT security aligns with Malaysia's broader vision for digital transformation, as outlined in the Malaysia Cyber Security Strategy 2020-2024, which seeks to enhance the nation's overall cyber resilience. The dynamic nature of cyber threats necessitates ongoing updates and improvements to the ICT security policy to adapt to new challenges and technologies (Haris@Harib, Sarijan and Hussin, 2017b). Regular review and development of cybersecurity policies, along with enforcement mechanisms, are crucial for maintaining compliance (Alam, Ibrahim and Karas, 2024). Addressing the digital divide between urban and rural areas is a challenge that the Sarawak Government ICT Security Policy must consider. Ensuring secure and equitable access to digital resources is essential for inclusive development (Horn and Gifford, 2022). Consequently, the Sarawak Government ICT Security Policy not only serves as a localized compliance framework but also contributes to Malaysia's efforts to address global cybersecurity challenges effectively.

### ***Factors Influencing Cybersecurity Compliance***

The successful implementation of cybersecurity compliance measures in organizations is contingent on a range of interrelated factors. These factors can be broadly categorized into individual, organizational and systemic domains. Each of these domains plays a critical role in determining the effectiveness of compliance strategies, particularly in governmental institutions like the SSEU, which operate in a highly regulated and resource-sensitive environment.

*Individual Factors: Awareness, Training and Technical Proficiency:* At the individual level, the awareness and technical proficiency of employees are fundamental to ensuring adherence to cybersecurity policies. Employees represent the first line of defence against cyber threats and their actions can either fortify or compromise an organization's cybersecurity posture.

Studies have consistently shown that cybersecurity awareness campaigns and regular training sessions significantly reduce incidents of non-compliance and accidental breaches. The intention to comply, influenced by awareness and understanding of security policies plays a crucial role. Security education and awareness programs can improve employees' intention to comply (Chiniah and Ghannoo, 2023)(Ofori *et al.*, 2022). Effective training and awareness programs are essential to improve employee compliance with cybersecurity policies (Thamae, Abdullah and Mujinga, 2024). For example, programs that emphasize phishing detection, safe password practices and secure data handling equip employees with the knowledge to identify and avoid common cyber risks. There is a demand for improved cyber situational awareness (SA) among security practitioners in Malaysia. However, the current capabilities and assessments do not meet this demand. Enhancing SA involves understanding it from the perspective of human operators and developing methods to measure and improve it effectively (Gutzwiller, Dykstra and Payne, 2020). In the context of SSEU, fostering a culture of continuous learning is critical to ensuring that employees understand and internalize the principles outlined in the Sarawak Government ICT Security Policy.

*Organizational Factors: Leadership Support, Enforcement Mechanisms, and Resource Allocation:* Organizational factors, particularly leadership commitment and resource management, are critical enablers of cybersecurity compliance. Institutions that prioritize cybersecurity at the strategic level tend to demonstrate higher levels of policy adherence and resilience against cyber threats.

Strong leadership and commitment from top management are critical in fostering a culture of compliance. Management's active involvement in promoting security policies can significantly influence employees' compliance behaviour (Assefa and Tensaye, 2021). Leaders who actively endorse and communicate the importance of cybersecurity initiatives signal to employees that compliance is a priority. At SSEU, leadership can drive this agenda by regularly assessing compliance metrics, addressing gaps and reinforcing the significance of complying to ICT security policies. Robust enforcement mechanisms ensure that policies are applied uniformly and deviations are promptly addressed. Mechanisms such as regular audits, incident reporting systems and clear disciplinary procedures for non-compliance are essential. For SSEU, integrating these mechanisms with their operational workflows ensures a structured approach to cybersecurity management. Adequate allocation of financial and human resources is indispensable for maintaining compliance. Implementing cybersecurity measures requires investments in advanced technologies, employee training programs, and expert consultation.

*Systemic Factors: Infrastructure Limitations, Technological Advancements and Policy Clarity:* The systemic environment in which an organization operates also significantly influences its ability to achieve cybersecurity compliance. These factors are often external to the organization but have a profound impact on its compliance capabilities.

Inadequate infrastructure, such as outdated ICT systems and insufficient network security tools, poses a significant challenge to cybersecurity compliance. For SSEU, ensuring that their ICT infrastructure aligns with the standards set forth in the Sarawak Government ICT Security Policy is a foundational requirement. Upgrading legacy systems, implementing robust firewalls and ensuring secure data storage are crucial steps toward achieving compliance. Developing methods to measure security performance can help organizations assess their ability to protect, discern, react, and recover from cyberattacks (Magnusson, Dalipi and Elm, 2023). While technological advancements can enhance cybersecurity, they also introduce new risks. Emerging technologies such as cloud computing, Internet of Things (IoT) and artificial intelligence (AI) present opportunities for improved security but require updated compliance frameworks. SSEU must remain agile in adapting its policies to accommodate these advancements while mitigating associated risks. The ease of use and accessibility of security tools can affect compliance. Tools that are user-friendly and integrate seamlessly into daily operations encourage adherence to security policies (Abukar Aweis, Isak Abdirahman and Jeilani Mohamud, 2024).

While these factors provide a comprehensive view of the influences on cybersecurity compliance, it is important to consider the dynamic nature of the cybersecurity landscape. As threats evolve, organizations must continuously adapt their compliance strategies to address new challenges. Additionally, the balance between regulatory compliance and proactive security measures remains a critical consideration, as organizations strive to protect against emerging threats while meeting existing standards (Adebola Folorunso *et al.*, 2024c). The interplay between individual, organizational and systemic factors highlights the multifaceted nature of cybersecurity compliance. For entities like SSEU, addressing these factors requires a holistic approach that combines employee training, strategic leadership, resource investment and policy refinement. By aligning efforts across these dimensions, SSEU can strengthen its cybersecurity posture and ensure sustained adherence to the Sarawak Government ICT Security Policy.

The digital divide in Sarawak, particularly between urban and rural areas, exacerbates cybersecurity challenges. Many remote villages in Sarawak lack basic infrastructure such as paved roads and grid electricity, which hampers the deployment of digital technologies. Although mobile phone and internet access have been introduced under Malaysia's Universal Service Provision, the quality and speed of these services remain inadequate for many users (Horn and Rennie, 2018). In rural areas, the use of smartphones for information search is prevalent, but the effectiveness is limited by low-speed internet and limited digital literacy. A strong connection exists between the perceived usefulness of smartphones and their actual use, indicating a need for improved digital literacy training (Sandun, Alan and Mat Jusoh, 2023). Rural agencies often lack access to advanced technologies and sufficient training resources, making compliance more difficult compared to their urban counterparts. While significant progress has been made in addressing the digital divide in Sarawak, the issue remains complex and multifaceted. The digital divide is not only about access to technology but also involves the skills and cultural relevance of digital content. Efforts to bridge this divide must consider the unique needs and contexts of rural communities, ensuring that technology is both accessible and meaningful. Additionally, the role of alternative media and digital platforms in shaping political and social landscapes in Sarawak highlights the broader implications of digital access beyond mere connectivity (Fernandez, Pandian and Abu Bakar, 2014).

The integration of advanced technologies, such as those used in automotive systems, presents cybersecurity challenges. The adoption of standards like ISO/SAE 21434 is necessary to

manage cybersecurity risks effectively. This standard provides a framework for identifying, assessing and mitigating risks throughout the lifecycle of automotive systems (Siddiqui *et al.*, 2023). The use of machine learning in cybersecurity is still in its nascent stages in Malaysia. While it offers potential for addressing complex cyber threats, further research and development are needed to mature these technologies and integrate them effectively into existing cybersecurity frameworks (Rananga and Venter, 2024).

While these gaps highlight significant challenges, they also present opportunities for growth and improvement. By addressing these issues, Malaysia can enhance its cybersecurity resilience and competitiveness on a global scale. Moreover, the development of national standards harmonized with international guidelines, such as ISO 27032, can provide a structured approach to improving cybersecurity practices across various sectors (Markov and Tsirlov, 2014). However, the rapid evolution of cyber threats necessitates continuous adaptation and innovation in cybersecurity strategies to stay ahead of potential risks.

The existing literature on cybersecurity compliance reveals notable inconsistencies and gaps that hinder the development of effective, multi-dimensional strategies. These challenges are especially pertinent in the Sarawak and Malaysian contexts, where unique regional and cultural factors shape the cybersecurity landscape. Addressing these gaps requires a shift toward more inclusive research methodologies that integrate technical, human, organizational, and systemic dimensions. For SSEU and similar agencies, localized and context-specific analyses are essential to bridge the gap between policy and practice, ensuring sustainable compliance in an era of evolving cyber threats.

## RESEARCH METHODOLOGY

### *Research Design*

This study adopts a quantitative research design to assess cybersecurity compliance within the Sarawak Security and Enforcement Unit (SSEU). A multidimensional framework is employed to investigate the influence of individual, organizational, and systemic factors on adherence to the Sarawak Government ICT Security Policy (Dasar Keselamatan ICT Kerajaan Negeri Sarawak Bil. 1/2012). This design facilitates a holistic evaluation of compliance gaps across multiple hierarchical levels within the SSEU, ensuring a comprehensive understanding of the challenges and enabling the development of targeted, evidence-based strategies to address them effectively. Compliance frameworks ensure consistent security measures and foster a security-first culture across all organizational levels (Adebola Folorunso *et al.*, 2024d). The study also applies PMT and TAM to guide the survey design and data analysis where PMT constructs include Threat Appraisal which assesses employees perceptions of the severity of cybersecurity threats and their vulnerability to such threats and Coping Appraisal, which measures self-efficacy (confidence in following policies), response efficacy (belief in the effectiveness of measures) and response costs (effort required to comply). TAM constructs include Perceived Usefulness, which explores whether employees believe cybersecurity tools enhance their work efficiency and Perceived Ease of Use, which evaluates whether employees find these tools intuitive and user-friendly.

## ***Population and Sampling***

The importance of selecting appropriate sampling methods is highlighted in quantitative research, where different techniques such as simple random sampling, stratified sampling and convenience sampling are employed based on the research objectives and population characteristics (Hossan, Dato' Mansor and Jaharuddin, 2023). The target population for this study comprises employees of the Sarawak Security and Enforcement Unit (SSEU) across all hierarchical levels, including Top Management, the Management and Professional Group, Implementation Group I and Implementation Group II. A stratified random sampling technique is utilized to ensure proportional representation from each hierarchical group, facilitating the identification of compliance variations across organizational strata. The sample size is determined in accordance with the total population of SSEU employees, ensuring statistical reliability, representativeness and the robustness of the study's findings.

TABLE 1. *Categories of The Employee*

<b>Category</b>	<b>Description</b>
Top Management (TM)	This group includes the highest level of decision-makers and strategic planners within the organization. Their role is crucial in shaping cybersecurity policies and ensuring compliance at an institutional level.
Management and Professional Group (P&P)	This level consists of middle-management personnel and professionals who play a pivotal role in implementing policies, managing resources and overseeing cybersecurity measures.
Implementation Group I (AKP1)	Employees in this category are primarily involved in operational activities and the execution of cybersecurity strategies. Their adherence to policies is key to effective implementation.
Implementation Group II (AKP2)	Representing the frontline workforce, this group is responsible for carrying out routine tasks and interacting directly with technological and operational systems.

## ***Data Collection Methods***

TABLE 2. provides a detailed breakdown of the survey questionnaire used for data collection in the study. The questionnaire, consist of a total of 24 questions is divided into five sections, each designed to capture specific dimensions of cybersecurity compliance and practices. The questionnaire's structure ensures a comprehensive evaluation of factors influencing cybersecurity compliance by balancing demographic data, awareness, policy enforcement, risk perception and practical application. The distribution of questions across these categories reflects the multidimensional approach of the study, enabling a nuanced understanding of compliance behaviours within the SSEU.

TABLE 2. *Number of Questionnaire*

Type of questions	Number of questions
Section A: Demographic	6
Section B: Awareness of Circular	5
Section C: Organization's Cyber Security Policies	4
Section D: Cybersecurity Risk	4
Section E: Cybersecurity Practices	5
Total Questions	24

### *Scope and Limitations*

This research is confined to the Sarawak Security and Enforcement Unit (SSEU), with a specific focus on adherence to the Sarawak Government ICT Security Policy. While the findings are intended to address compliance gaps within SSEU, their applicability to other government agencies may be limited. Potential challenges include participant availability and the risk of response bias, which may influence the data collection process. Despite these limitations, the study seeks to generate meaningful insights and actionable recommendations to enhance cybersecurity compliance within the Sarawak public sector.

The study employs a structured and systematic methodology to evaluate cybersecurity compliance within the Sarawak Security and Enforcement Unit (SSEU). By adopting quantitative research design and leveraging a multidimensional framework, the study ensures a comprehensive examination of individual, organizational and systemic factors influencing adherence to the Sarawak Government ICT Security Policy. Through a stratified random sampling approach, proportional representation across hierarchical levels is achieved, enhancing the validity and reliability of the findings. Data collection, facilitated by a structured digital questionnaire, ensures accessibility and high response rates, while rigorous statistical analyses provide meaningful insights into compliance patterns and determinants. Ethical considerations, including informed consent and data confidentiality, are prioritized throughout the process. Despite limitations in generalizability and potential response bias, the methodology is designed to yield robust, actionable insights and recommendations to improve cybersecurity compliance within the Sarawak public sector.

## **DISCUSSION**

The findings of this study highlight critical gaps in cybersecurity compliance across the hierarchical levels of the Sarawak Security and Enforcement Unit (SSEU) with operational groups (AKP1 and AKP2) displaying lower awareness and training levels compared to Top Management and the Professional & Management (P&P) group. This discussion addresses these findings, aligning them with research questions and objectives to provide actionable insights.

### ***Cybersecurity Compliance Levels Across Hierarchical Groups***

The study reveals significant disparities in compliance levels, particularly between Top Management and the operational groups. Top Management demonstrates the highest awareness and understanding of the Sarawak Government ICT Security Policy, consistent training exposure and frequent engagement with cybersecurity discussions. In contrast, AKP1 and AKP2 exhibit low mean scores for policy awareness and training participation, reflecting practical barriers to compliance. These gaps are attributed to limited exposure to training programs and inadequate policy dissemination mechanisms.

While the ANCOVA results showed no statistically significant differences in policy understanding across hierarchical groups, practical disparities observed in descriptive statistics underscore the need for targeted training and awareness campaigns for operational groups. This aligns with findings from the literature, which emphasize the critical role of tailored training in bridging compliance gaps at the operational level.

### ***Operational and Systemic Challenges in Compliance***

The findings identify key barriers to compliance, including insufficient training, weak policy enforcement mechanisms and resource limitations. Operational staff reported time constraints as a significant challenge, indicating that balancing daily tasks with cybersecurity obligations is a recurring issue. Moreover, resource disparities, particularly in AKP2, exacerbate these challenges, leaving frontline employees with inadequate access to the tools and knowledge required for compliance.

Weak enforcement mechanisms, highlighted by employees across all levels, suggest systemic gaps in leadership-driven accountability. Although Top Management displays consistent compliance and training, their role in cascading policies and monitoring adherence at lower levels remains limited. The absence of structured mechanisms for policy enforcement, such as regular audits and performance tracking, undermines the agency's ability to achieve uniform compliance.

Based on the findings, a hierarchical pyramid framework has been developed to align roles, responsibilities and compliance measures across different organizational strata within the SSEU. Fig 6 shows a framework to ensure that interventions address specific challenges faced by Top Management (TM), Professional & Management Group (P&P), Implementation Group I (AKP1) and Implementation Group II (AKP2), fostering a multi-dimensional approach to compliance improvement.

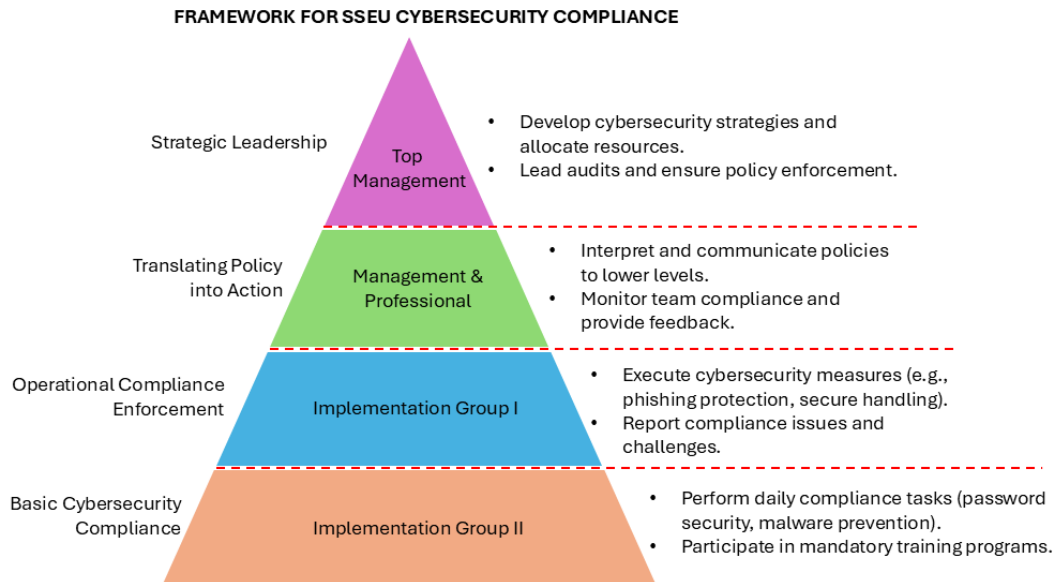


FIGURE 1. *SSEU Hierarchical-Level-Specific Strategies Framework of Cybersecurity Compliance*

This study identified significant disparities in cybersecurity compliance across hierarchical levels within SSEU with Top Management demonstrating stronger alignment with policies while operational groups (AKP1 and AKP2) faced challenges such as insufficient training, resource limitations and weak enforcement mechanisms. To address these gaps, a hierarchical pyramid framework was developed, aligning roles, responsibilities and tailored interventions across four levels which is Top Management, P&P, AKP1 and AKP2. This framework ensures top-down communication of policies, upward reporting for accountability and targeted strategies to improve awareness, training, and resource allocation. By implementing this framework, SSEU can foster a culture of compliance, enhance its cybersecurity posture, and reduce vulnerabilities in line with the Sarawak Government ICT Security Policy.

## CONCLUSION

This study provides a detailed evaluation of cybersecurity compliance within the Sarawak Security and Enforcement Unit (SSEU), emphasizing the critical factors influencing adherence to the Sarawak Government ICT Security Policy. The findings highlight significant disparities across hierarchical levels, with operational staff facing greater challenges due to limited awareness, insufficient resources and weak enforcement mechanisms. By adopting a multi-dimensional approach, the study underscores the importance of addressing human, organizational and technological factors to enhance cybersecurity resilience in public administration. The findings underscore the importance of a multi-dimensional approach to advancing cybersecurity compliance in the Sarawak Civil Service and similar public administration systems. Tailored training, resource optimization, leadership advocacy, and cultural transformation are critical to fostering a proactive and resilient cybersecurity environment. Policymakers and practitioners must prioritize these strategies to build trust, engagement, and compliance at all levels. By addressing the challenges identified, public sector organizations can achieve greater cybersecurity resilience and safeguard critical systems in an increasingly complex threat landscape. This study provides a

foundation for enhancing cybersecurity practices and compliance frameworks in public administration paving the way for secure and effective governance.

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## BOOK REVIEW

*Savara*, 'Mistis Timur Menenggara', Isu 18, April - Jun 2026, Pelita Tenggara Entreprise dan IBDE pp. 1-80.

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The issue number 18 of *Svara, Borneo: Mistis Timur Menenggara*, is a breath of fresh air. It takes Borneo as a subject of inquiry approached from a contemporary arts perspective and steeped in power analysis. This makes the accounts presented through the mediums of essay, poetry and fiction urgent. Each piece in the collection takes position on critical topics today such as decolonization of knowledge, cultural politics, state-capital collaboration and sacredness. The editor Hafiz Hamzah has made sound judgement in curating the collection by integrating aesthetic and geographic dimensions. Borneo is represented from the viewpoints of Sabah, Sarawak and East Kalimantan. Collective memory, the West and East Malaysia divide, identity politics, revivalism and cultural imperialism are headlines from Sabah and Sarawak. From Kalimantan, ecology and political economy depicting the realpolitik of exclusion and the dark side of development took centre stage.

By accident or design, Borneo is conceived in a neat dichotomy between the soft power of the East Malaysia and the hard power of Kalimantan. This raises a question as to why cultural hegemony is the preferred lens to view power in the context of the East Malaysia. This question is pertinent because culture, whilst appearing non-political, in reality, interpellates. It constructs a subject who internalises social and political order and becomes its most passionate believer. In *Svara*, the subject animates in the voices of Kiah and her reminiscences; in the dilemma of a poet torn between faith and ancestral legacy; and in the rekindling of nostalgia among the cultural firsters. The prominence of culture has made the pieces necessary not only because they were sincere introspections, but also because they allow readers to observe the operation of cultural power. This matter is relevant especially in the two articles, 'Borneo Literature Bureau' by Benedict Samling and 'Dayang Bintang' by Dayang Nurhazieqa Hamzani, as they represented two different currents in the cultural hegemony in Sarawak: the assertion for ethnic distinction and the search for a decolonizing narrative.

The article 'Borneo Literature Bureau' argued that the languages spoken by non-Malay ethnic groups in Sabah and Sarawak are facing an acute crisis resulting from their marginalisation in the mainstream language use in the writing and textual forms. Malay language is construed as the dominant language that dominated the narrative and the thinking process into a Malay centric. Aspiring authors from the non-Malay ethnic groups like Iban, Bidayuh and Kadazan-Dusun found

themselves having to sacrifice their cultural identity by writing in Malay to make their writings available to a broader audience. The article proposed a solution which it believed capable to uplift the ethnic languages by reviving the British-era institution the Borneo Literature Bureau (BLB). BLB is presented as a panacea and by reviving it, the voices and the writings of the people from various cultural backgrounds would become visible. The article stated that the closure of BLB in 1976 after it was taken over by Dewan Bahasa dan Pustaka had triggered the decline in ethnic literature. The publication of stories and tales in ethnic languages had ceased because of the loss of institutional support that they once enjoyed. Even more telling, the idea and the discourse pertaining to the ethnic identities had become the victims of the closure. It was believed that a reborn BLB would be an act of knowledge and cultural justice for diverse ethnic groups.

‘Dayang Bintang’ asked a critical question: why was there a lack of decolonial and anticolonial thought and awareness in Sarawak. Several instances were cited to show the continuity of colonial narrative and discourse. English language continued to be presented as a superior language for development and modernity; the legacies of Sarawak has essentially earmarked for the Brooke Rajahs institutions; and the narrative and identity of the nation were embellished by the Brooke-centric positioning that the Brookes’ government was not a colonial project but a joint-rule with the native chiefs. The author offered two possible reasons for the persistency of the colonial mindset today: the exclusivist tendency of nation-state; and the misunderstanding and scepticism towards a Malay-Muslim nationalism had discouraged the progress in alternative discourse. The article underscored the challenges faced in the decolonising of knowledge that has been hindered by the prevalence of Brooke hegemony and the isolation of the discourse which did not conform with the known blueprint.

I found the article revealing because they exemplified the case where culture is understood as a cause and a solution for a problem. The lack of recognition toward ethnic languages is thought to be a consequent of the national language policy. The call for sectarian or ethnic autonomy is not a unique problem to Sarawak but an example of a phenomenon described by Jacques Bertrand (2024) as “sub-state nationalism”. It characterises the weakening influence of the core state to exercise greater control over the sub-territory, hence, enabling the sub-group to assert more autonomy and distance from the centre. Cultural identity is often used to assert autonomy, for example, in reviving a tradition or language. The article, however, has isolated the political background to concentrate on the cultural dimension alone. As a result, a wider or perhaps, more persistent problems such as disconnection between politics and community and unmet aspirations are matters which are not only material but also potentially capable in empowering the ethnic community to have a better control in shaping and preserving their collective identity and heritage. Furthermore, the transformative role that the ethnic communities have played through the medium of national language should not be disregarded. One of the contributors to *Svara* Borneo’s issue, Clariessa Kesulai is an accomplished poet and writer whose works deal with spirituality and the clash of tradition. To tell her story about religious experience from a non-Muslim position is not only trailblazing but also educational. Sarawak born poet and novelist Jong Chian Lai who writes in Malay language won SEA Write Award in 2006.

The intractable Brookes’ legacies in Sarawak are manifested as a cultural knowledge problem which is persuasive but also overstating the Brookes’ hegemony. Indeed, Brookes enduring legacies, as the author of ‘Dayang Bintang’ correctly noted, was the museum, while many others

like economy, health, infrastructure and governance were left much to be desired. Another Brookes' legacy was history as each of the rajah had a book to speak for their reign. James Brooke's personal secretary Spencer St John wrote a biography *The Life of Sir James Brooke* (1879) that was based on the first rajah journals. Charles Brooke encouraged his district officer C. Bampfylde to write a book *History of Sarawak under its Two White Rajahs* (1909). The third and final rajah Vyner had enlisted Robert Payne to write *The White Rajahs of Sarawak* (1960). Nevertheless, the Brookes side of history was far from being authoritative. His European officers, missionaries and novelists had also written their side of history that were often not flattering to the government. We can hardly say the Brookes got their history right.

On the last note, the theme of *Mistis Timur Menenggara* is a curious one. People in Sabah, Sarawak and Brunei today rarely refer to a geographic bearing like *timur* or *tenggara* when describing themselves to the people outside their state. Our neighbours in West Kalimantan who visited Sarawak would describe themselves as *orang Sambas*, *Pontianak* or *Mempawah*. State identity remains an important way to describe and distinguish. Ultimately, people in Borneo understood themselves and each other as people of the land, coastal, river or *hulu*.

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