

## Implementation of Sustainable Tourism Based on Bamboo Resources in Saung Angklung UDJO

Arief Syaifudin<sup>1\*</sup>, Hendarmawan<sup>2</sup>, Sunardi<sup>3</sup>, Evi Novianti<sup>4</sup>, Hari Hariadi<sup>5</sup>

<sup>1</sup> Expert Staff to the Mayor of Bandung for Government, Law and Politics; [arief20004@mail.unpad.ac.id](mailto:arief20004@mail.unpad.ac.id)

<sup>2,3,4</sup> Sustainable Tourism Study Program, Postgraduate School Padjadajaran University; [hendarmawan@unpad.ac.id](mailto:hendarmawan@unpad.ac.id), [sunardi@unpad.ac.id](mailto:sunardi@unpad.ac.id), [evi.novianti@unpad.ac.id](mailto:evi.novianti@unpad.ac.id)

<sup>5</sup> National Research and Innovation Agency, Jakarta, Indonesia; [raden\\_barie@yahoo.com](mailto:raden_barie@yahoo.com)

\*Corresponding Author: [arief20004@mail.unpad.ac.id](mailto:arief20004@mail.unpad.ac.id), [raden\\_harie@yahoo.com](mailto:raden_harie@yahoo.com)

**Citation:** Syaifudin, A., Hendarmawan, Sunardi, Novianti, E. & Hariadi, H. (2026). Implementation of Sustainable Tourism Based on Bamboo Resources in Saung Angklung UDJO, *Journal of Cultural Analysis and Social Change*, 11(1), 1265-1270. <https://doi.org/10.64753/jcasc.v11i1.4065>

**Published:** January 06, 2026

### ABSTRACT

Bamboo is closely linked to efforts to preserve the culture of the people of West Java. As part of daily life, bamboo is used in various aspects, including traditional architecture, arts and crafts, and handicrafts. In architecture, bamboo is used to build traditional Sundanese houses, bridges, stages, and places of worship, reflecting the continued preservation of cultural heritage and traditional construction techniques. Black bamboo, the primary material for making angklung, has unique characteristics not shared by all bamboo species. This study analyzes the implementation of sustainable bamboo-based tourism at Saung Angklung Udjo, focusing on the use of black bamboo for angklung and souvenir production, and its contribution to cultural preservation and local economic development. The study covers the sustainability of raw material supply, the production process, and its impacts on environmental, socio-cultural, and economic aspects. The primary threat to the availability of black bamboo comes from land conversion for residential purposes. To address this, Saung Angklung Udjo has partnered with Perhutani in Tasikmalaya to cultivate black bamboo, reflecting a commitment to nature conservation and ecosystem protection. The study used a descriptive qualitative approach through in-depth interviews with five angklung artisans, three bamboo farmers, and two Saung managers, as well as field observations and data triangulation. The results demonstrate the integration of sustainable tourism principles through the use of bamboo as a cultural raw material and a means of environmental education, which strengthens cultural identity, stimulates the local economy, and raises environmental awareness. However, challenges remain, such as limited capital for artisans, minimal skills regeneration, and inadequate partner infrastructure (e.g., bamboo drying facilities). Although waste management and reforestation have been well-established, the implementation of a green economy needs to be strengthened through product innovation and business diversification. Recommendations include: (1) engaging the younger generation through bamboo-based education, (2) strengthening partner infrastructure, and (3) diversifying bamboo products to expand the market and increase economic and cultural value. These steps are expected to establish Saung Angklung Udjo as a model for sustainable tourism based on local resources.

**Keywords:** Land Use Conversion, Bamboo, Local Economy, Cultural Preservation, Sustainable Tourism, Saung Angklung Udjo, Artisan Regeneration

### INTRODUCTION

Bamboo is closely linked to efforts to preserve the culture of the people of West Java. As part of daily life, bamboo is used in various aspects, including traditional architecture, arts and crafts, and handicrafts. In

architecture, bamboo is used to build traditional Sundanese houses, bridges, stages, and places of worship, reflecting the cultural heritage and traditional construction techniques that continue to be preserved. Furthermore, bamboo is also the primary material for making traditional musical instruments such as the *angklung*, an icon of Sundanese arts and culture. Bamboo handicrafts, such as *wayang* puppets, masks, and jewelry, also hold high artistic and cultural value.

Black bamboo, the primary material for making *angklung*, possesses unique characteristics not found in all bamboo species. Its uniqueness lies not only in its strength and flexibility but also in the resonance of the sound it produces, making it an ideal choice for traditional musical instruments like the *angklung*. However, the growth of black bamboo is highly dependent on specific ecosystem conditions, such as sufficient sunlight intensity, stable air humidity, balanced soil water content, and soil fertility. These factors create challenges in cultivating black bamboo widely, as not all regions have suitable environmental conditions.

In West Java, several regions, such as Majalengka, Kuningan, and Sukabumi, are known as producers of high-quality black bamboo. These areas have climates and soil conditions that support the growth of black bamboo. However, over time, pressure from land conversion due to infrastructure development and residential needs has threatened the preservation of the natural habitat of black bamboo. This phenomenon not only impacts the availability of raw materials for *angklung* but also threatens the sustainability of traditional Sundanese culture, which relies heavily on this natural resource. Therefore, preserving black bamboo through cultivation and environmental management is crucial to ensure the continuity of *angklung* production and maintain the cultural values inherent in this traditional musical art.

With population growth and land conversion, the sustainability of the black bamboo supply is increasingly threatened. Much land in black bamboo-producing areas has been converted to residential areas, reducing the availability of quality bamboo for *angklung* craftsmen. Consequently, the dwindling supply of raw materials has had a significant impact on the *angklung* craft industry, especially for craftsmen who rely heavily on the quality of the bamboo.

To source bamboo for the *angklung* at Saung *Angklung Udjo*, the management must source it from various regions. Majalengka, Kuningan, Sukabumi, and Tasikmalaya are the main bamboo suppliers, which have been the management's primary sources for *angklung* production. However, the quality of bamboo varies from region to region. Differences in soil contour, water content, altitude, season, and weather significantly influence the quality of the bamboo produced, thus impacting the quality of the *angklung* produced.

Another effort by the management of Saung *Angklung Udjo* to meet the raw material needs for *angklung* is by cultivating black bamboo on its own land and on land jointly owned by the West Java and Banten Forestry Corporations. The management's collaboration with Perhutani on a 10-hectare plot in Tasikmalaya is expected to meet the *angklung* production needs. UNESCO's recognition of the *angklung* marks the beginning of efforts to cultivate black bamboo through collaborations with various parties. In this way, it is hoped that the *angklung* art form will not be lost and can be preserved as a cultural heritage. A literature review reveals that research examining bamboo resources in relation to sustainable tourism implementation is limited. Existing literature focuses more on cultural performances [1] or tourism marketing but neglects the ecological dimension and raw material supply chain as the foundation of sustainability.

## RESEARCH METHODS

This research employed a qualitative approach with a case study method. This approach and method were used to gain an in-depth understanding of the context, meaning, and experiences of individuals/groups regarding the implementation of sustainable tourism in the utilization of bamboo resources at Saung *Angklung Udjo*. Data collection in this case study involved in-depth interviews, content analysis, observation, and document review.

The research location was not limited to Saung *Angklung Udjo*, but also included other locations that could provide relevant information related to the topic under study, including:

1. Saung *Angklung Udjo*, located at Jalan Padasuka No. 118, Pasirlayung, Cibeunying Kidul, Bandung City.
2. Udjo Ecoland, in Cimenyan Village, Bandung Regency, West Java 40197;
3. Jampang Black Bamboo Farmer Partners, Surade, Sukabumi Regency;
4. Tali Bamboo Farmer Partners in Wado District, Sumedang Regency.
5. Location of black bamboo in Majalengka (around Kertajati International Airport)

This study employed three qualitative instruments: document study, interviews, observations, and an open-ended questionnaire. Interviews were conducted with several informants, including:

1. Saung *Angklung Udjo* managers, including: Taufik Udjo; Satria Udjo; Caliss-Megita
2. *Angklung* artisans/artists involved in Saung *Angklung Udjo*: Kang Rahmat.
3. Bamboo farmers who supply Saung *Angklung Udjo*.

4. Academics/Sundanese cultural practitioners who understand the use of bamboo (Angklung): Yadi Mulyadi.
5. Forestry expert who understands bamboo ecosystems: Budi Irawan.
6. Local economist and sustainable economics expert: Dr. Zulkifli Harahap, M.Par.

The document study was conducted using various data and information officially recorded internally by Saung Angklung Udjo. In this study, the observation technique used was non-participant observation. Non-participant observation is a data collection method in which the researcher does not participate in the activities of the people being observed.

To strengthen the qualitative data collection, the study also used a questionnaire as a supporting method, distributed through Google Search. The questionnaire was designed to obtain direct insights from the community and tourists regarding the implementation of sustainable tourism at Saung Angklung Udjo. A total of 125 people completed the Google form: 28 from the local community and 97 from tourists.

Qualitative data analysis uses data triangulation techniques. Data triangulation is the analysis of multiple data collection techniques on the same topic to ensure research validity, involving multiple research samples in cross-validation [3]. (Flick, 2018). By conducting data triangulation, researchers will arrive at a more complete and clear picture of the phenomenon or situation being investigated.

## RESULTS AND DISCUSSION

### **Bamboo Resource Business Processes in Supporting the Sustainability of Arts and Culture at Saung Angklung Udjo**

The threat of land conversion in key producing areas such as Surade, Kuningan, and Ciamis impacts the availability of quality raw materials. The local philosophy that places bamboo as the guardian of slope ecosystems (gawir) demonstrates the importance of conservation efforts, including replanting and sustainable management of bamboo forests. Black bamboo (*Gigantochloa atroviolaceae*) is a species with excellent acoustic qualities, making it a key material for the traditional angklung musical instrument. The acoustic qualities of black bamboo are influenced by its physical and mechanical properties, which have been examined in several studies.

Black bamboo has high flexural strength and elastic modulus, which are important factors in producing a clear and resonant sound when used as an angklung [4]. Black bamboo is also known for its high lignin content, which acts as a natural binder and contributes to its structural strength [5].

Changes in spatial patterns due to industrial and residential development can result in the loss of important green areas, including bamboo habitat. This study highlights how land-use changes can impact the environment, including water absorption and increased flood risk, which in turn can damage black bamboo habitat [6]. The impact of this land use change is not only limited to habitat loss but can also affect the livelihoods of communities dependent on black bamboo. Sari and Yuliani emphasize that the conversion of agricultural land to non-agricultural uses can result in the loss of employment opportunities and income for farmers, ultimately impacting community food security [7].

### **Bamboo Processing Process at Saung Angklung Udjo**

#### ***Bamboo Farmer Partner Stage***

Saung Angklung Udjo's partner farmers know the right time to harvest bamboo to produce the best quality raw materials. Furthermore, the bamboo drying process is carried out meticulously to prevent damage during storage or further processing. This process is crucial in determining the bamboo's resistance to weather and humidity, which can affect the final quality of the angklung [8].

These bamboo farmers possess specialized knowledge of bamboo cutting techniques, ensuring that the resulting raw material is the appropriate size and shape for angklung production. This technique not only affects the physical quality of the bamboo but also impacts the resulting angklung sound. Precisely cut bamboo produces better resonance, thus enhancing the quality of the angklung music played at Saung Angklung Udjo. The sound quality of the angklung is highly dependent on precise bamboo cutting techniques, a skill passed down through generations by the bamboo farmers [9].

#### ***Angklung Craftsman Partnership Stage***

This partnership structure is not simply a division of labor, but also a system that ensures that craftsmen possess the specialized skills needed to maintain product quality. A clear partnership structure can enhance collaboration and coordination among various actors in the production chain, resulting in high-quality products [10].

This partnership also allows for the proper allocation of responsibilities based on each craftsman's expertise, reducing the risk of errors in production. The frame craftsman is responsible for shaping the angklung frame,

which is the instrument's main foundation, while the sound craftsman is responsible for ensuring the bamboo tubes produce the correct tones. This partnership structure also allows for a more equitable distribution of profits among the craftsmen [11].

### **Saung Angklung Udjo's Contribution to Socio-Cultural Aspects Through Bamboo-Based Arts**

#### ***Preservation of Bamboo-Based Arts and Culture at Saung Angklung Udjo***

Saung Angklung Udjo (SAU) plays a strategic role in preserving Sundanese arts and culture through the implementation of sustainable bamboo-based cultural tourism [12]. SAU serves not only as a tourist destination but also as a space for education and cultural transmission, engaging the local community, the younger generation, and domestic and international tourists. Through art performances, workshops, and educational programs, SAU raises public awareness of the importance of cultural heritage and strengthens Sundanese cultural identity in everyday social life [13].

Furthermore, SAU contributes to fostering tolerance for cultural diversity through cross-cultural interactions created in angklung performances, which involve the active participation of audiences from diverse cultural backgrounds [14]. This participatory experience fosters mutual respect and enhances understanding of cultural differences, both for tourists and local communities [15]. Angklung also serves as a medium for cultural diplomacy and soft power for Indonesia in promoting its national cultural identity internationally.

However, the implementation of sustainable cultural tourism at Saung Angklung Udjo still faces several challenges, such as the unequal distribution of socio-cultural benefits among the surrounding community [16]. Cultural awareness, which is still limited to the education sector and the minimal involvement of the wider community, indicates the need for a more inclusive and participatory approach in cultural tourism management [17]. Therefore, strengthening local community involvement is key to ensuring the sustainability of bamboo-based arts and culture and the equitable distribution of socio-cultural benefits [18].

#### ***Saung Angklung Udjo's Contribution to the Community's Economy Through Bamboo-Based Art***

Saung Angklung Udjo (SAU) serves as a cultural center that successfully integrates the preservation of angklung art with sustainable tourism, resulting in a positive economic impact for the surrounding community [19]. Through the involvement of local residents as staff, artists, and craftspeople, SAU creates jobs, increases income, and reduces unemployment in the surrounding area [20]. Furthermore, its arts scholarship program, skills training, and support for bamboo craftspeople contribute to local economic growth and strengthen the community's human resource capacity [21].

SAU also applies the principle of community-based tourism by providing space for community involvement in the management and utilization of cultural tourism resources [22]. Support for local artisans through providing market access and promoting cultural products allows for increased income while maintaining the authenticity of angklung art as a cultural heritage [23]. Modernization of angklung art through performance innovation and adaptation to market tastes also increases tourist appeal and strengthens the sustainability of the culture-based creative economy [24].

However, research shows that there are still challenges in the economic contribution of SAU, such as the unequal distribution of economic benefits, dependence on the number of tourist visits, and minimal involvement of the younger generation in cultural tourism management [25]. Fluctuations in tourist numbers can directly impact the income stability of local communities that depend on the cultural tourism sector [26]. Therefore, business diversification and increasing inclusive community participation are important strategies to maintain the sustainability of the bamboo arts-based economy at Saung Angklung Udjo [27].

#### ***Saung Angklung Udjo's Contribution to Environmental Conservation***

Saung Angklung Udjo (SAU) has demonstrated a strong commitment to environmental conservation through the application of sustainable tourism principles in the management of its area and activities (Ritzén & Sandström, 2020). These efforts are evident in the implementation of reduce, reuse, and recycle (3R)-based waste management, which aims to reduce environmental impact while extending the life cycle of materials used (Espinoza & Salgado, 2019). Furthermore, environmental education for visitors and the surrounding community encourages behavioral changes toward more environmentally friendly and sustainable consumption practices (Randle & Hohnen, 2022).

The use of leftover bamboo or rang-rang as fuel for smoking angklungs reflects the application of resource efficiency and a circular economy concepts in culture-based creative industries (Ghisellini et al., 2016). This innovation not only reduces waste and dependence on fossil fuels but also lowers the carbon footprint of the angklung production process (Suprayogi & Wijayanti, 2022). Water and plant management through reforestation, hydroponic, and aquaponic systems also strengthens environmental sustainability by increasing water efficiency and providing educational value for visitors (Rakocy et al., 2006; Graber & Junge, 2009).

Udjo Ecoland's presence as part of the Northern Green Belt emphasizes SAU's role in preserving natural ecosystems and biodiversity, particularly bamboo, the primary raw material for angklungs (Scurlock et al., 2000). This initiative aligns with the concepts of ecological sustainability and biocultural diversity, which emphasize the link between cultural preservation and the natural environment (Maffi, 2005; Fischer et al., 2014). However, research indicates the need for increased education for bamboo farmers and a stronger commitment to implementing a green economy and a circular economy to achieve optimal and long-term environmental sustainability (Pearce et al., 2012; Kirchherr et al., 2018).

### **Framework for a Sustainable Tourism Model Based on Bamboo Resources at Saung Angklung Udjo**

The sustainable tourism model based on bamboo resources at Saung Angklung Udjo was developed in response to the serious challenge of land conversion that threatens the sustainability of black bamboo (*Gigantochloa atroviolacea*), the primary raw material for angklung (Saung Angklung Udjo, 2024). The decline in bamboo habitat due to residential and infrastructure expansion has a direct impact on the availability of raw materials for bamboo musical instruments and the sustainability of the traditional arts that depend on them (Saung Angklung Udjo, 2024). Therefore, the development of this model aims to maintain the sustainability of bamboo-based arts and culture, empower local communities economically, and encourage the conservation of black bamboo as a strategic ecological and cultural resource (Saung Angklung Udjo, 2024).

This model is designed as an integrated system that connects socio-cultural, economic, and environmental dimensions in a mutually reinforcing manner (Saung Angklung Udjo, 2024). The socio-cultural dimension plays a key role in driving the preservation of bamboo performing arts and cultural education, driving increased tourist visits (Saung Angklung Udjo, 2024). This increased tourism activity opens up economic opportunities for local communities as artists, craftspeople, tour guides, and MSMEs, ultimately creating an economic incentive to preserve and care for bamboo vegetation to prevent its diversion (Saung Angklung Udjo, 2024).

The implementation of this model is strengthened through cross-sector collaboration based on a pentahelix approach involving the government, community, industry/MSMEs, academics, and the mass media (Etzkowicz & Leydesdorff, 2000). The government plays a role in formulating conservation and spatial planning policies, the community is the main actor in bamboo cultivation and preservation, industry drives the creative economy, academics provide scientific assistance, and the media builds educational narratives and public awareness (Timothy & Boyd, 2003; Throsby, 2010; Castells, 2009; UNESCO, 2017). The synergy of these five pillars forms a sustainable tourism system that is oriented not only towards economic profit, but also towards the long-term preservation of local culture and ecological balance (Saung Angklung Udjo, 2024).

## **CONCLUSION**

The bamboo resource business process at Saung Angklung Udjo is integrated, from raw material procurement and management to utilization in various arts and cultural products, such as angklungs and bamboo crafts. Bamboo availability is still affected by limited storage space, the rainy season, and land conversion in bamboo-producing areas, which has resulted in a decline in the supply of quality bamboo. Bamboo management is carried out in partnership with local farmers and artisans, but still faces challenges such as workforce regeneration, limited warehousing infrastructure, and production efficiency. Nevertheless, the diversification of bamboo products demonstrates economic potential that supports the sustainability of bamboo-based arts and culture.

Saung Angklung Udjo contributes to socio-cultural, economic, and environmental aspects through the preservation of traditional bamboo-based arts integrated with educational tourism activities. The involvement of local communities as artists, artisans, and entrepreneurs creates job opportunities and increases income, although these economic benefits are not shared equally by all surrounding communities. Environmentally, the management of beautiful tourist areas, bamboo conservation, and the application of waste management and circular economy principles demonstrate a commitment to sustainable tourism. Overall, the development of bamboo-based tourism at Saung Angklung Udjo demonstrates an integrative effort in maintaining a balance between cultural preservation, strengthening the local economy, and environmental sustainability.

## **BIBLIOGRAPHY**

Hermawati, A., Mas, N., & Rahman, A. Y. (2025). *Systematic Literature Review (SLR) untuk Kelestarian Pariwisata: Mengintegrasikan Pengembangan Sumber Daya Manusia, Model Manajemen, dan Teknologi Big Data*. *Equilibrium: Jurnal Ilmiah Ekonomi, Manajemen dan Akuntansi*, 14(2). Penelitian ini melakukan tinjauan literatur terhadap strategi holistik untuk keberlanjutan pariwisata, tetapi tidak fokus pada bambu sebagai sumber daya alam dalam konteks pariwisata

- Flick, U. (2018). Doing qualitative data collection—charting the routes. *The SAGE Handbook of Qualitative Data Collection*, 1–16.
- Supriyanti, Y., Bachtiar, G., & Nasution, N. (2012). SIFAT FISIK DAN MEKANIK BAMBULAPIS DENGAN KULIT DAN TANPA KULIT TERHADAP SNI 01–5008.7–1999.
- Prabawa, D., & Miyono, M. (2018). Mutu Biopellet dari Campuran Cangkang Buah Karet dan Bambu Ater (*Gigantochloa atter*) (The Quality of Biopellet from Rubber Seed Shell and Ater Bamboo (*Gigantochloa atter*)). *Jurnal Riset Industri Hasil Hutan*, 9, 99. <https://doi.org/10.24111/jrihh.v9i2.3524>
- Nurkhaerani, F., & Debora, F. (2023). Pengaruh perubahan pola ruang terhadap luas area banjir di kawasan industri dan dampaknya pada aktivitas supply chain. *Jurnal Teknik Sipil Terapan*, 5(2), 54–67. <https://doi.org/10.47600/jtst.v5i2.596>
- Sari, R., & Yuliani, E. (2022). Identifikasi Dampak Alih Fungsi Lahan Pertanian Ke Non Pertanian Untuk Perumahan. *Jurnal Kajian Ruang*, 1, 255. <https://doi.org/10.30659/jkr.v1i2.20032>
- Sun, H., Wang, J., Li, H., Li, T., & Gao, Z. (2023). Advancements and challenges in bamboo breeding for sustainable development. *Tree Physiology*, 43(10), 1705–1717. <https://doi.org/10.1093/treephys/tpad086>
- Briscoe, N. J., Morris, S. D., Mathewson, P. D., Buckley, L. B., Jusup, M., Levy, O., Maclean, I. M. D., Pincebourde, S., Riddell, E. A., Roberts, J. A., Schouten, R., Sears, M. W., & Kearney, M. R. (2023). Mechanistic forecasts of species responses to climate change: The promise of biophysical ecology. *Global Change Biology*, 29(6), 1451–1470. <https://doi.org/10.1111/gcb.16557>
- Maheshwari, B., Kumar, V., & Kumar, U. (2006). Optimizing success in supply chain partnerships. *Journal of Enterprise Information Management*, 19(3), 277–291. <https://doi.org/10.1108/17410390610658469>
- London, T., Anupindi, R., & Sheth, S. (2010). Creating mutual value: Lessons learned from ventures serving base of the pyramid producers. *Journal of Business Research*, 63(6), 582–594. <https://doi.org/10.1016/j.jbusres.2009.04.025>
- Ritzer, G., & Ryan, M. (2010). *The globalization of nothing 2*. Wiley-Blackwell.
- Anwar, H., Suryani, N., & Wibowo, A. (2021). Youth participation in cultural heritage preservation for sustainable local traditions. *Journal of Cultural Heritage Management and Sustainable Development*, 11(3), 345–357.
- Zaman, M., Khan, A., & Ahmad, M. (2020). Cultural interaction through tourism and its role in promoting mutual understanding and respect among societies. *Journal of Tourism and Cultural Change*,
- Kim, S., & Jang, S. (2023). Cultural contact through tourism and its impact on tolerance and social cohesion in host communities. *Journal of Travel Research*, 62(5), 1032–1046.
- Rawls, J. (1971). *A theory of justice*. Harvard University Press.
- Tosun, C. (2006). Expected nature of community participation in tourism development. *Tourism Management*, 27(3)
- Dangi, T. B., & Jamal, T. (2016). An integrated approach to sustainable community-based tourism. *Tourism Management Perspectives*, 18, 1–12.
- Butler, R. W. (2018). Sustainable tourism—Looking backwards in order to progress? *Tourism Geographies*, 20(1), 1–19.
- cheyvens, R. (2002). *Tourism for development: Empowering communities*. Pearson Education Limited.
- Todaro, M. P., & Smith, S. C. (2015). *Economic development* (12th ed.). Pearson Education.
- Suansri, P. (2003). *Community based tourism handbook*. Responsible Ecological Social Tours Project
- Richards, G., & Wilson, J. (2006). Developing creativity in tourist experiences: A solution to the serial reproduction of culture? *Tourism Management*, 27(6)
- Howkins, J. (2010). *Creative ecologies: Where thinking is a proper job*. University of Queensland Press.
- Goodwin, H., & Santilli, R. (2009). *Community-based tourism: A success?* International Centre for Responsible Tourism (ICRT).
- Fletcher, R. (2013). Tourism, dependency, and development: Political ecology of tourism. *Journal of Sustainable Tourism*, 19(6),
- Schwab, K. (2016). *The fourth industrial revolution*. World Economic Forum.