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Reducing Single-Use Plastic Products in Viet Nam Tourism: Case Studies of Quang Nam and Ninh Binh Provinces

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ABSTRACT

Plastic waste (PW) pollution has become a pressing global issue. The tourism sector is significantly affected by PW but is also a major contributor to PW. This is mainly due to the widespread use and disposal of single-use plastic products (SUP). This study examines the current situation of SUP usage in two key tourist destinations in Vietnam, Ninh Binh and Quang Nam provinces, identifies the limitations and challenges faced and proposes potential solutions. The methods used in this study include desk research, surveys, and interviews with tourists, accommodation establishments, travel agencies, and local communities. The study results indicate that the use of SUP in tourism in Ninh Binh and Quang Nam is still prevalent, with limited awareness among stakeholders of existing legal regulations. Businesses in the tourism sector face numerous difficulties, including financial constraints, lack of human resources, and limited availability of alternative products. Considering these challenges, several solutions have been proposed, including raising awareness, disseminating policies and laws, promoting green and sustainable tourism practices, implementing guidelines to reduce SUP usage and minimize PW in the tourism industry, and providing support and incentives for tourism businesses to gradually eliminate the use of SUP. Additionally, there is a need for improved policies aimed at reducing SUP usage and minimizing PW in the tourism sector.

INTRODUCTION

Plastic pollution is a growing concern for countries worldwide. It is estimated that 310 million tonnes of plastic waste (PW) is generated annually, which is equivalent to 2,200 plastic bottles per person globally (Bauske and von Münchhausen, 2019). According to the Organisation for Economic Co-operation and Development (OECD), the amount of PW has more than doubled from 156 million tonnes in 2000 to 353 million tonnes in 2019 (OECD, 2024). Under a baseline scenario, this number

is expected to increase to 617 million tonnes by 2040 (OECD, 2024). The majority of this waste consists of packaging and single-use plastic products (SUPs) that are used for only a short period (Bauske and von Münchhausen, 2019). Nearly two-thirds of all PW comes from applications with a useful life of less than five years, including packaging (40%), consumer products (12%), and textiles (11%) (OECD, 2022).

PW has a detrimental impact on economic and social development, particularly in the tourism industry. While tourism contributes to the issue of using single-use plastics (SUP) and the influx of tourists, it also suffers greatly from the presence of PW. The aesthetic appeal and attractiveness of tourist destinations, such as beaches and coastlines, are significantly affected by the presence of PW. According to the WWF, the amount of waste in the Mediterranean Sea increases by up to 30% in the summer, resulting in severe ecological damage and causing tourism losses of up to 268 million euros due to plastic pollution (WWF, 2019). The Asia Pacific region suffers an estimated loss of US\$ 622 million annually due to the costs of cleaning beaches and lost tourism revenue. Litter on Skagerrak beach in Bohuslan (Sweden) causes the local community an average annual loss of US\$22.5 million due to a decline in tourism. In South Africa, for every additional ten pieces of plastic debris per square meter on the beach, 40% of foreign tourists and 60% of domestic tourists do not want to return (UNEP, 2016). In general, marine pollution caused by PW has consequences for the local economy due to a decrease in investment in the tourism sector, as well as other activities that rely on the marine environment, such as fishing and recreation (Jang et al., 2014; McIlgorm et al., 2011; Mohammed, 2002).

Vietnam is situated in the center of Southeast Asia and the Asia-Pacific region, a region experiencing dynamic economic and tourism development. Vietnam's tourism resources are rich, diverse, and unique, providing favorable conditions for developing distinctive tourism products that attract tourists. Vietnam's Tourism Development Strategy for 2030 has identified 07 dynamic tourism development areas (Viet Nam National Administration of Tourism, 2020). Ninh Binh is famous for the Trang An Scenic Landscape Complex, which UNESCO has recognized as a World Heritage Site for both its cultural and Natural Values; Quang Nam is famous for the ancient town of Hoi An and the My Son Sanctuary, both of which UNESCO has also recognized. Ninh Binh and Quang Nam are identified as two key areas for tourism development in Vietnam. In Vietnam, PW is also increasing rapidly. In 2018, the PW generated reached approximately 2.7 million tons, rising to 2.83 million tons in 2019 and about 2.93 million tons in 2021. In 2021, the amount of PW generated in 28 coastal localities was about 1.56 million tons, higher than 1.37 million tons/year in the remaining 35 provinces/cities (WWF, 2023). With the strong development of the tourism industry in the coming time, PW generated from SUP in the tourism sector will be a significant problem. The objectives of this study are to assess the status of SUP use and PW management in the tourism sectors of Ninh Binh and Quang Nam, as well as to examine the awareness and actions of relevant parties, identify limitations and challenges, and propose solutions for improvement in the future.

2. LITERATURE REVIEW

Tourism is identified as one of the major sectors that significantly contributes to the generation of PW from SUP (Kong et al., 2023; Mejjad et al., 2023; Thushari and Senevirathna, 2020). Many studies have also shown that SUP accounts for most PW, and tourists are the primary agents (Hu et al., 2024; Pandey et al., 2022). In addition, local communities and tourism businesses are also other agents that create PW from SUP. Therefore, currently, in the world, there are numerous policies, strategies, plans, and initiatives aimed at managing and minimizing the use and disposal of SUP by these subjects.

2.1. Sources and amounts of SUP generated from tourism activities

Mihai and Mejjad noted that the utilization and disposal of SUP have led to a buildup of plastic debris along the coast (Mejjad et al., 2023; Mihai, 2013). This has led to an overwhelming amount of plastic waste being produced by the tourism industry, surpassing the capacity of existing waste treatment facilities. Nguyen, V.H. surveyed 87 tourists and 02 5-star hotels in Ho Chi Minh City, Vietnam, showing that SUP such as plastic water bottles, bathroom toiletries; plastic straws, nylon laundry bags, trash bags, boxes, spoons, cups, etc. are SUP that are used and discarded after use (Nguyen et al., 2022).

The use of SUP in tourism increases the generation of PW. Tran et al. estimated that if each tourist used one water bottle and one plastic bag per day, the Vietnamese tourism industry would have generated 200 million plastic bottles and bags in

2018 (Tran et al., 2020). Kong et al. studied 20 beaches in China and found that PW is one of the main components of waste. The average weight ratio of PW in marine waste during the low season was 26.34%, and it increased to 34.68% during the high season. PW mainly consisted of plastic packaging bags, plastic bottles, and bottle caps, which are SUPs (Kong et al., 2023). Truong, S.V et al. also pointed out in their study at Sam Son Beach Resort, Vietnam, that tourism activities have the second largest scale of PW emissions, accounting for over 40% of the total amount of PW, in which tourists are the largest emitters, followed by accommodation establishments, restaurants and finally local people (Truong et al., 2023). Maione, C. when quantifying the accumulation of PW at coastal tourist sites in Zanzibar, Tanzania, it was determined that PW accounted for nearly half (48.5%) of the waste discharged into the environment, in which single-use packaging was the dominant type of PW at all sampling locations (Maione, 2021). Thus, studies have shown that PW from tourism accounts for a significant portion of solid waste, primarily due to the use of SUP, such as single-use packaging (plastic bags, plastic/styrofoam boxes), plastic water bottles, and personal care items (shampoo/shower gel containers, hair caps, etc.).

2.2. Solutions to reduce SUP in tourism

To reduce plastic waste in general and in the tourism sector in particular, countries around the world have been focusing on various solutions such as (i) developing and implementing regulations on PW reduction, (ii) raising awareness and responsibility for PW reduction, (iii) reducing at source, classifying, collecting and managing plastic waste; (iv) enhancing the role of participants in tourism activities; (iv) replacing disposable plastic products in tourism service establishments... Regarding policies, laws, and implementation, Taryono (Taryono and Wulandari, 2021), and Cano et al. (Cano et al., 2021) suggested that effective PW management is important, appropriate PW management strategies are needed and beach resorts must follow PW management procedures. Furthermore, enforcing laws and regulations that prohibit PW dumping in public spaces, especially on beaches, can deter such behaviors and promote a culture of environmental responsibility among tourists and service staff (Mejjad et al., 2023). In another study conducted in Pune, India, M.Z.M. Nomani et al. (Nomani et al., 2023) suggest that extending producer responsibility (EPR) and implementing a ban on single-use plastics (SUP) would lead to significant changes in the production and use of recycled plastics.

Regarding awareness raising and responsibility for waste reduction, many studies have shown that awareness affects tourists' intention and behavior to reduce waste, so it is necessary to promote the implementation of these measures (Ahmad et al., 2023; Inocente et al., 2023; Kuijper, 2003; Ounsaneha et al., 2020; Pandey et al., 2022; Sultan et al., 2021). Source reduction, waste separation, and energy recovery are key strategies for comprehensive waste management. By implementing these measures, tourist areas can proactively reduce the amount of waste generated and improve waste treatment measures (Helm et al., 2023; Kong et al., 2023; Kumar et al., 2024; Ounsaneha et al., 2020; Ratnawati et al., 2023; Zhang et al., 2023). Some studies also suggest that increasing participation and enhancing the role of stakeholders, particularly local communities, is a crucial aspect of reducing waste in tourist areas. Therefore, engaging local communities through initiatives such as waste management programs (Latumahina et al., 2023; Mabuyi Gumede, 2018), beach cleaning activities, and efforts to classify waste, reduce, reuse, and recycle can contribute significantly to lowering PW (Duckett, 2015). Additionally, PW reduction activities necessitate harmonious cooperation among various stakeholders, including local authorities, tourism businesses, professional social organizations, and government agencies (Nugraha and Flora, 2022; Syakti et al., 2019). Regarding the alternative to SUP, according to Friedrich (Friedrich, 2023), depositing on takeaway plastic products is accepted by tourists. Nugraha et al. (2022) also suggested that integrating green, environmentally friendly, recyclable, and reusable products in resorts can reduce PW, lower costs, and support sustainability.

In general, numerous studies have been conducted on PW. However, studies on the current status of SUP used in the tourism sector are still quite vague. Although studies have identified the source, volume of discharge, and principal components of SUP generated from tourism activities, studies have not specifically assessed the level of discharge of different stakeholders such as tourists (international, domestic), classes of accommodation establishments (4-5 stars, 3bstars, 1-2 stars, motels...) or travel and entertainment businesses... This may lead to solutions that are not specific to each subject, are challenging to implement, and are ineffective.

3. MATERIALS AND METHODS

3.1. Research locations - Ninh Binh and Quang Nam

Ninh Binh and Quang Nam are major tourist destinations in Viet Nam (Fig. 1), boasting World Heritage Sites and renowned for their diverse range of unique tourism products, which attract a large number of tourists to visit. However, Ninh Binh and Quang Nam are also facing increasing pressure from plastic waste due to tourism activities. Choosing case studies at these locations helps to assess in a general, comprehensive and effective way the current situation of SUP in different locations with different characteristics, thereby proposing solutions that can be widely applied throughout the country.

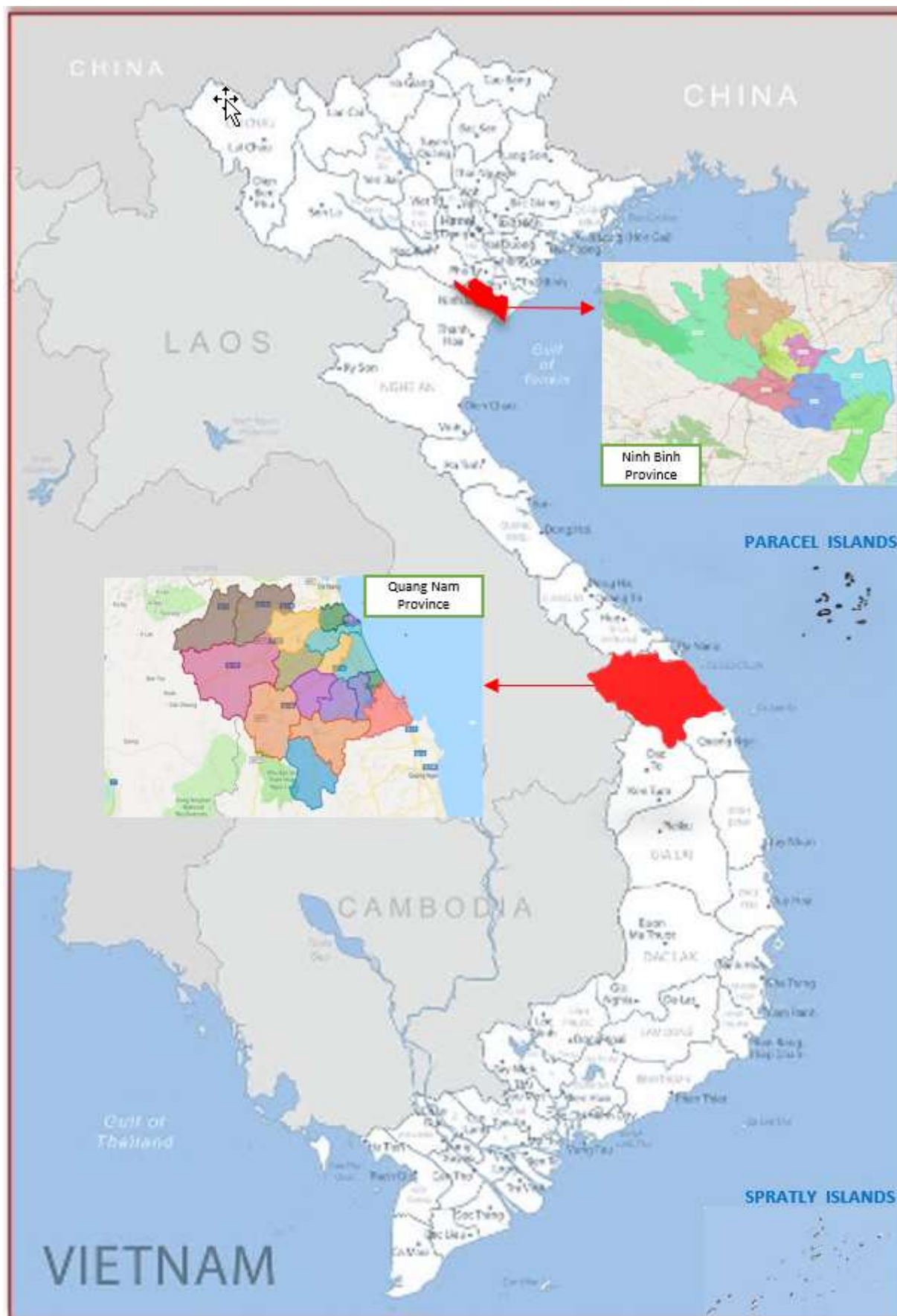


Fig. 1. Location of Ninh Binh province and Quang Nam province

(Source: <https://gis.gso.gov.vn>)

Ninh Binh is a coastal province in the southern part of the Red River Delta in the North of Vietnam, with a natural area

of 1,411.78 km² (Fig 1.), and a population of about 1,010,700 people in 2022 (General Statistics Office, 2023). Ninh Binh is famous for its tourist areas and destinations such as Trang An, Tam Coc - Bich Dong, Van Long Ramsar site, and Cuc Phuong National Park... In addition, Ninh Binh is also home to many valuable historical and cultural heritage, such as the relics of Hoa Lu - the capital of the Dinh and Le dynasties in the 10th and 11th centuries, and Bai Dinh Pagoda - the largest temple in Southeast Asia. With outstanding tourism resource values, Ninh Binh has oriented tourism to become a key economic sector by 2030, welcoming 14 million tourists, including 2.4 million international tourists (Vietnam National Administration of Tourism, 2024). *Quang Nam* is a coastal province in the South Central Coast region of Vietnam, with an area of 10,574.86 km² (Fig.2), and a population of 1,519,400 people in 2022 (General Statistics Office, 2023). Quang Nam has famous tourist areas such as Hoi An Ancient Town, Cu Lao Cham Biosphere Reserve, My Son Sanctuary, Thanh Ha Pottery Village, and Cam Thanh Coconut Forest. Additionally, the province offers a variety of sea and cultural tourism experiences. By 2030, Quang Nam is expected to become an international-class tourism center, welcoming 18 million visitors, including 7.5 million international visitors (Vietnam National Administration of Tourism, 2024).

3.2. Research method

Desk review

The authors used the desk research method to review and analyze documents on using SUP in general, particularly in the tourism industry, and PW management solutions. The documents include relevant international studies/works such as reports of the World Bank, OECD, UNEP etc. and domestic studies/works of international organizations in recent times. Types of SUP in this study include plastic water bottles; plastic bags; plastic cups; plastic boxes; plastic plates; wet tissues; straws and stirrers; toothbrushes; foam boxes/plastic boxes for take-away food; plastic wrap; razors, headgear; combs; knives, scissors, spoons, forks, plastic ...

Survey of relevant stakeholders

The study conducted investigations and surveys in Ninh Binh and Quang Nam in April-June 2023, specifically as follows:

Surveyed stakeholders: Focus on 4 main groups: tourists, accommodation establishments, local communities, and travel agencies. Tourists to Ninh Binh and Quang Nam were randomly selected to ensure representation of both domestic and international tourists. For accommodation establishments, random sampling was conducted among those in the two provinces, ensuring inclusion of all categories: 5-star, 4-star, 3-star, and below 3-star. The travel agencies were deliberately selected as companies that regularly bring tourists to Quang Nam and Ninh Binh. For local residents, sampling was conducted randomly among residents living in or around tourist areas in the two provinces.

According to Hair et al. (Hair et al., 2019), the minimum sample size is determined by 5 times the number of observed variables. The number of observed variables for tourists, accommodation establishments and communities are 48, 36 and 20, respectively, corresponding to the minimum sample sizes of 240, 180 and 100 subjects, respectively. For travel agencies, the study identified 49 travel agencies that regularly bring tourists to the two localities above.

The study surveyed 330 tourists, 190 accommodation establishments, 49 travel agencies and 100 communities and collected a number of questionnaires with full information as required, specifically as follows: (i) 316 tourists, including 158 international tourists and 158 domestic tourists; (ii) 185 accommodation establishments, with a total of 12,643 rooms, of which, there are 52 5-star and 4-star establishments, with 9,526 rooms; 33 3-star establishments, with 1,809 rooms; 100 establishments with less than 3-star standards, with 1,308 rooms. (iii) 49 travel agencies, including 15 international travel agencies and 34 travel agencies serving both international and domestic customers. (iv) 98 people, including 52 in Ninh Binh and 46 in Quang Nam.

Survey content: Current status of SUP use; current status of management and reduction of waste in tourism (accommodation establishments, travel agencies); awareness; actions/solutions, plans to reduce waste in tourism (accommodation establishments, travel agencies); needs and recommendations to reduce waste in tourism. The survey content was presented in the form of a semi-structured questionnaire, which was reviewed by experts from the Vietnam Tourism Association. Based on their feedback, the questionnaires were revised and supplemented and piloted. Finally, the

questionnaires were sent to experts for a second round of consultation to finalize before data collection. The questionnaire for international tourists was translated into English to facilitate the collection of information from foreign tourists.

Survey method: The questionnaire is designed to suit each subject, and sent to the subjects via official dispatch, email, or direct interview. During data collection, subjects were informed about the purpose and significance of the survey and were asked to respond honestly and objectively. Once completed, the responses are collected and used to synthesize and analyze information and data.

Data processing method: Information from valid survey forms was entered and processed using Microsoft Excel software. Some statistical tests such as T-Test, One-way ANOVA were performed on SPSS software.

Synthetic analysis

The study synthesizes and analyzes collected documents and survey results to determine the types and quantities of main SUP arising from tourism activities in Vietnam in general and Ninh Binh and Quang Nam in particular. On that basis, the study proposes measures to reduce the use of SUP in tourism activities. The assessment of the current status of SUP used by tourists is investigated for the whole trip, then based on the average length of stay of tourists to Quang Nam and Ninh Binh through annual statistical reports of the two localities above, to determine the average amount of SUP emissions per tourist per day. The average length of stay of tourists to Ninh Binh in the period of 2019 - 2022 is about 1.4 days of which international visitors are 1.45 days and domestic visitors are 1.3 days (Ninh Binh Statistics Office, 2022). The average length of stay of tourists to Quang Nam in the period of 2019 - 2022 is about 1.66 days of which international visitors are 1.65 days, domestic visitors are 1.66 days (Quang Nam Statistics Office, 2022).

4. RESULTS AND DISCUSSIONS

4.1. Current status of using SUP by tourism stakeholders in Ninh Binh and Quang Nam

Tourists

The survey results show that when traveling, the types of SUP commonly used by tourists are plastic water bottles, about 3.64 bottles/day; plastic bags, about 1.48 bags/day; plastic cups, plastic boxes, plastic plates, about 0.84 piece/day...(Table 1). Some of the results of this study are also consistent with another study that found that the average tourist consumed 2-6 bottles/day (S and EJP, 2016).

Using T-Test between 2 groups of international tourists and domestic tourists, the results showed that there was a statistically significant difference in variance ($\text{Sig} < 0.001$) in the use of SUP by these 2 groups, specifically: international tourists often use 1.34 times more bottled water; 1.94 times more razors; 2.24 times more cap than domestic tourists. On the contrary, domestic tourists tend to use 1.93 times more plastic bags; 2.17 times more plastic cups, plastic boxes, and plastic plates; and 2.73 times more wet tissue paper than international visitors (Table 1 & Fig. 2).

Table 1: Average number of plastic products used per tourist per day

Unit: Piece

No	SUP	Average	International tourist	Domestic tourist
1	Plastic water bottle	3.64	4.17	3.10
2	Plastic shopping bag	1.48	1.02	1.97
3	Plastic cups, plastic boxes, plastic plates	0.84	0.53	1.15
4	Wet wipes	0.96	0.52	1.42
5	Straws and stirrers	0.71	0.68	0.74
6	Toothbrush	0.70	0.78	0.62
7	Styrofoam/plastic boxes for takeaway food	0.60	0.51	0.69
8	Plastic wrap (food wrap)	0.54	0.42	0.67
9	Razor	0.47	0.62	0.32
10	Cap	0.47	0.65	0.29
11	Comb	0.47	0.55	0.39
12	Knives, scissors, spoons, forks, plastic	0.39	0.28	0.51

(Source: Synthesized by authors from research's results)

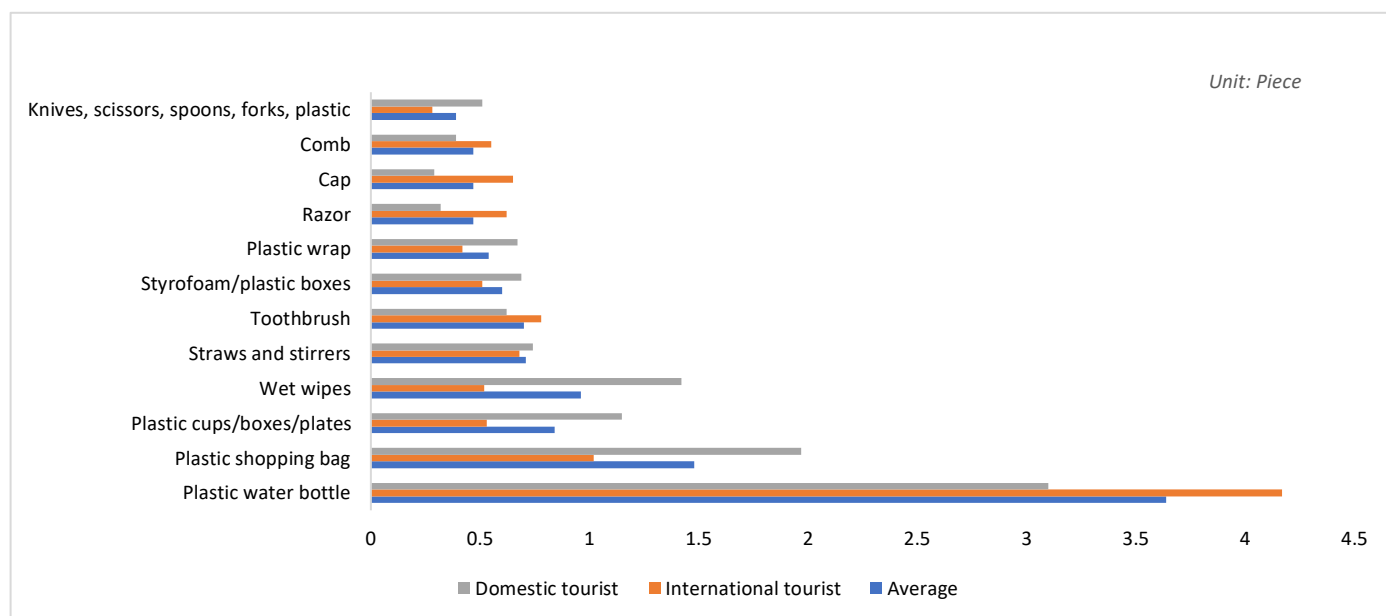


Fig. 2. Comparison chart of SUP usage by tourists

(Source: Synthesized by authors from research's results)

Compared to daily usage (Table 4), when traveling, each person has a significantly higher need to use SUP, with 100% of tourists using SUP, the number of plastic bottles used is 1.87 times more; styrofoam boxes/plastic boxes are 1.54 times more; knives, scissors, spoons, forks, plastic are 2.6 times more... This difference may be due to tourists having a “vacation mentality” that is, relaxing their eco-friendly habits, creating a gap between awareness and action. In addition, convenience services and packaged goods provided by shopping and catering establishments also lead to more SUP use by tourists.

In general, the volume and type of SUPs used by tourists will vary, depending on factors such as the geographical location of the tourist destination, local regulations on the use of plastics, the availability of eco-friendly alternatives, and the awareness and behavior of tourists.

Accommodation establishments

The survey results show that SUP is widely used in tourist accommodation establishments in Vietnam, including plastic water bottles, plastic garbage bags, plastic bottles for shampoo and shower gel, plastic toothbrushes, plastic laundry bags, plastic toothpaste tubes (Table 2 & Fig. 3).

Table 2. Annual average number of SUP used per room

No	SUP	Average (Piece)	Ratio (%)	Classified by star rating (piece)		
				4-5*	3*	Under 3*
1	Plastic water bottle	183.74	24.65	238.4	56.23	11.25
2	Plastic garbage bags	123.45	16.56	128.75	130.34	101.92
3	Plastic bottles for shampoo and shower gel	96.99	13.01	83.28	143.12	150.23
4	Plastic Toothbrush	84.33	11.31	56.28	189.82	154.36
5	Laundry collection plastic bags	83.70	11.23	100.25	58.16	19.17
6	Plastic toothpaste tube	78.91	10.58	52.02	189.76	132.22
7	Plastic cotton swabs	40.43	5.42	38.56	50.22	48.43
8	Cap	37.23	4.99	40.67	30.24	30.23
9	Other	16.76	2.25	-	-	-
Total		745.55	100	-	-	-

(Source: Synthesized by authors from research's results)

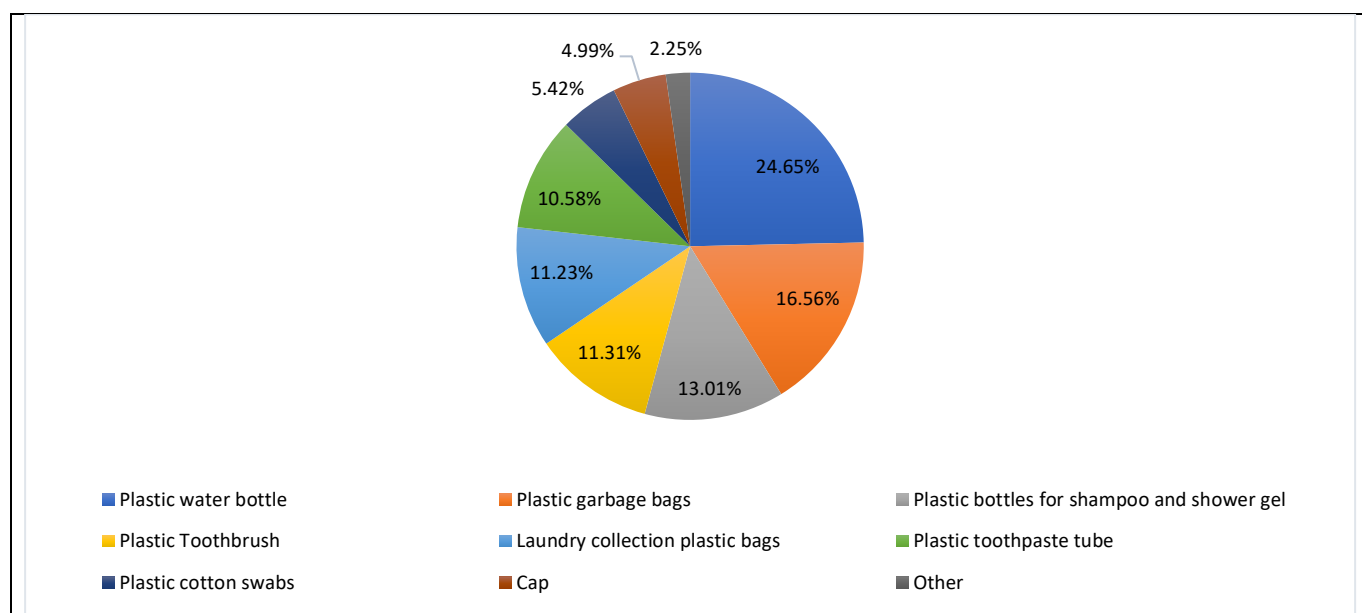


Fig. 3. Ratio of the annual average number of SUP used per room

(Source: Synthesized by authors from research's results)

Using One-way ANOVA test between 3 groups of accommodation establishments 4-5*; 3*, and under 3*, the results showed that there was a statistically significant difference in variance ($\text{Sig} < 0.001$) in the use of SUP by these 3 groups of subjects, specifically: 4-5* standard accommodation establishments use many plastic water bottles, about 4 times more than 3* accommodation establishments and about 20 times more than 3* accommodation establishments. The number of plastic bags used for laundry collection by 4-5* accommodation establishments is also 1.9 times more than 3* accommodation establishments and 5.2 times more than 3* accommodation establishments. In addition, 4-5* standard accommodation establishments use more SUP than other accommodation establishments, such as plastic bags for guests to carry their items; packaging, plastic bags to wrap and hold products, souvenirs; stirring sticks; plastic cups... In Vietnam, mid-range and low-end accommodations (3* or below) often provide little or no bottled water, laundry bags, etc., directly reducing the room rental price for tourists, and enhancing price attractiveness. On the other hand, 3* or lower-rate accommodation establishments use a significantly higher amount of plastic items (2.8 to 3.4 times more), such as plastic toothbrushes and plastic bottles for shampoo and shower gel (1.8 times more) compared to 4-5* establishments. Other (SUP), such as shower caps and plastic cotton swabs, are used at similar levels across all establishments (Table 2 & Fig. 4).

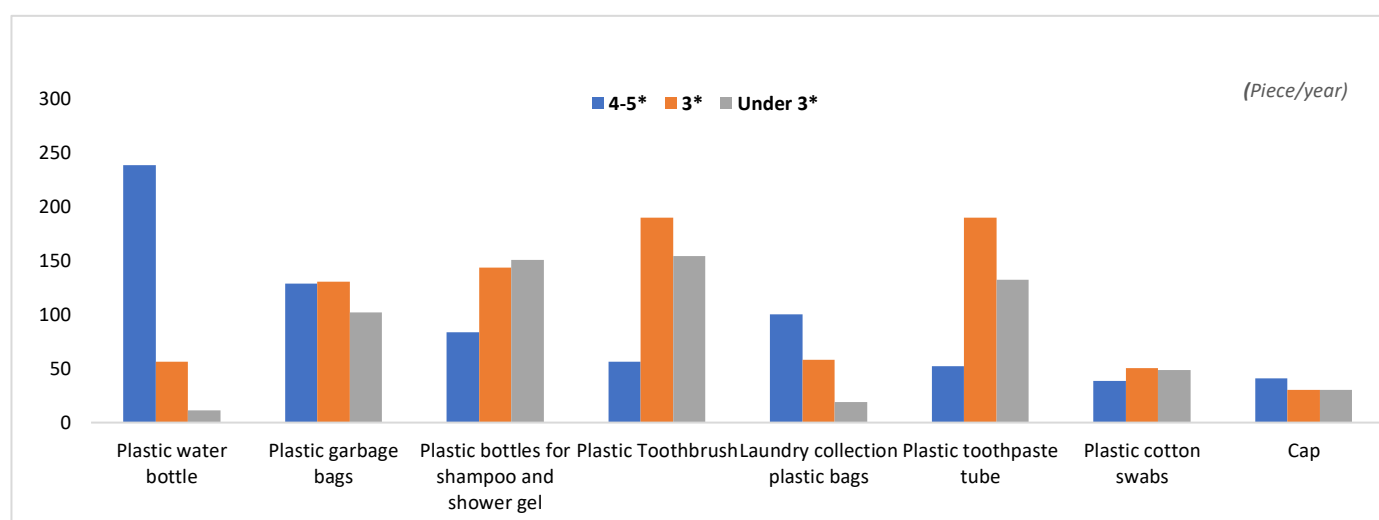


Fig. 4. Annual average number of SUP used at each type of accommodation facility

(Source: Synthesized by authors from research's results)

Travel agency

The survey results of travel agencies show that the types of SUP and the average quantity that businesses often use include: plastic water bottles (about 3,000 bottles/year), wet tissues (nearly 500 pieces/year), plastic shopping bags (over 400 pieces/year). In addition, there are other products such as plastic wrap, foam/plastic boxes, knives, spoons... (Table 3).

There is a difference between using SUP in the office and on tours. Specifically, the amount of plastic water bottles and wet tissues used on tours is many times higher than that in the office; while other SUP such as plastic ballpoint pens; plastic wraps, foam/plastic boxes, knives, spoons, forks, cups, and disposable plastic lids are much larger in the office than on tours (Table 3).

Table 3. Annual average number of SUP used by each travel agency in the office and on tours

No	SUP	Quantity (Piece/year)	Rate (%)
I	At the office		
1	Disposable plastic water bottles	342	25.26%
2	Plastic shopping bag	335	24.74%
3	Plastic wrap, foam/plastic boxes, disposable knives, spoons, forks	319	23.56%
4	Disposable plastic cups and lids	290	21.42%
5	Plastic ballpoint pen	68	5.02%
	Total	1,354	100%
II	On tour		
1	Disposable water bottle	2,666	81.18%
2	Wet wipes	484	14.74%
3	Plastic shopping bag	89	2.71%
4	Disposable plastic cups and lids	23	0.70%
5	Plastic wrap, foam box, straws, stirring sticks...	22	0.67%
	Total	3,284	100%

(Source: Synthesized by authors from research's results)

Local community

The results of the local communities' survey show that SUP plastic bags and plastic bottles for drinking water are the most commonly used by people in Ninh Binh and Quang Nam. 78.57% of people use plastic shopping bags, with an average of 1.95 bags/day; 70.41% use plastic bottles for drinking water, with an average of 1.07 bottles/day (Table 4).

According to statistics from the Ministry of Natural Resources and Environment of Vietnam in 2022, on average each household uses 5-7 plastic bags/day, with the average size of each household in Vietnam being 3.6 people (General Statistics Office of Vietnam, 2023), on average each person uses from 1.4-1.95 plastic bags/day. This proves that the results of the study are appropriate.

Table 4. Daily average number of SUP used per person

No	SUP	Usage Rate (%)	Average quantity (Pieces/day)
1	Plastic bag	78.57	1.95
2	Plastic bottles for drinking water	70.41	1.07
3	Straws and stirrers	35.71	0.36
4	Plastic wrap (food wrap)	35.71	0.78
5	Wet tissue	34.69	0.52
6	Disposable plastic cups, plastic boxes, plastic plates	33.67	0.32
7	Styrofoam/plastic boxes for takeaway food	28.57	0.39
8	Knives, scissors, spoons, forks, plastic	15.31	0.15
	Total	100%	-

(Source: Synthesized by authors from research's results)

Using T-Test for the survey results between local communities in 02 provinces, it shows that there is a difference in the use of SUP of these 02 groups of subjects, specifically: in Ninh Binh, people tend to use more plastic bags, 2.67 times more; plastic bottled water, 3.13 times more; wet tissues, 3.76 times more than people in Quang Nam... This may be because the work of reducing plastic waste in Quang Nam was implemented earlier and more actively than in Ninh Binh.

4.2. Activities and attitude of relevant stakeholders on reducing SUP in Ninh Binh and Quang Nam

Currently, the collection, transportation, and treatment of solid waste in Vietnam in general and the tourism industry in particular are still mostly carried out together with domestic solid waste. The total amount of solid waste generated is about 67,000 tons/day, with the amount of solid waste estimated at about 6,581 tons/day. The main method of treating solid waste is still landfilling, estimated at 70%, the rest is incineration and composting; the recycling rate of solid waste is only about 8-12%. For solid waste, the recycled rate of solid waste is only about 11% (WWF, 2023).

Vietnam has legal regulations on solid waste management in general and plastic waste in particular, issued by the Law on Environmental Protection 2020, Decree 08/2022/ND-CP and Circular 02/2022/TT-BTNMT. The goals and solutions for plastic waste management have been established in Decision No. 1746/QĐ-TTg on the National Action Plan on Ocean Plastic Waste Management and Decision No. 1316/QĐ-TTg on the Project to Strengthen Plastic Waste Management. Accordingly, after 2025, tourist areas and hotels are not allowed to use SUP and non-biodegradable plastic bags; by 2030, the production and use of SUP must be eliminated. Many provinces/cities have issued local action plans on ocean plastic waste management and implemented models to reduce and limit plastic waste generation.

Tourists

For tourists, the survey results from this study show that over 75% of tourists support limiting the use of SUP, in which the group of tourists with a college degree or higher has a higher rate of support for limiting the use of SUP than the remaining group. In addition, this is also the group with a higher level of understanding of regulations and roadmaps for reducing SUP. In addition, the rate of support for limiting the use of plastic water bottles for domestic and international tourists is very high, about 90%; the rate of tourists supporting the reduction of plastic bag use is also over 80%. These results are similar to the study on PW in Sam Son City, Vietnam (Truong et al., 2023), 83.25% of tourists are willing to pay an additional 2 - 5% of the room rental price to replace the SUP equipped in the hotel. However, the rate of tourists understanding the regulations on SUP restriction routes is still low, about 80% of tourists do not know these regulations.

Accommodation facilities

Currently, many accommodation establishments have been applying SUP reduction solutions, focusing on the bedroom area, reception area, lobby, toilet area, kitchen area, restaurants, bars; conference rooms; swimming pools, spas, gyms, etc. High-end accommodation establishments of large corporations such as Marriott, Hilton, Hyatt, Six Senses, etc. have pioneered in applying many SUP reduction measures (Insights EHL, 2019). The survey results of this study also show that about 65% of accommodation establishments have classified PW. About 62% of accommodation establishments are willing to choose suppliers who are environmentally responsible (including reducing PW). However, only 31% of accommodation establishments confirmed that they were aware of the roadmap to ban SUP use and only 20% of establishments are applying specific initiatives and measures to reduce PW; this is a relatively small number compared to the expectation of the target of reducing PW in the future.

Several other studies have also addressed the willingness of tourism facilities to choose environmentally friendly suppliers. According to the National Environment Service (NES), 2024 designed and conducted an online survey to assess community awareness, attitudes, and behaviors regarding single-use plastics (SUPs) in the Cook Islands. 72% of respondents working in tourism considered plastic pollution a significant issue, with 67% willing to invest in eco-friendly alternatives (National Environment Service, 2024).

Travel agencies

Recognizing the importance of reducing plastic waste, many tourist destinations have actively implemented activities to reduce SUP use. Cu Lao Cham World Biosphere Reserve, Quang Nam has communicated to raise awareness about reducing plastic waste and organized waste sorting at the source, banning plastic bags on the island. Co To Island District, Quang Ninh, has also piloted the application of regulations requiring tourists not to bring plastic bottles, plastic bags, and materials that pose a risk of environmental pollution when traveling to Co To from September 1, 2022 (Minh Hue and Hai Ngan, 2022).

The survey results of this study show that most travel agencies are concerned about the issue of plastic waste. Accordingly, 75% of travel agencies have classified waste and plastic waste; over 60% collect and sell plastic waste to recycling units. About 21% of businesses are applying initiatives and measures to eliminate SUP (plastic water bottles, shopping bags, wet tissues, and plastic cups...) in tours; some businesses also plan to eliminate 7-8 SUP from now to 2025. However, up to 60% of travel agencies are still unaware of the regulations on itineraries prohibiting the use of SUP.

Local communities

For the local communities in Ninh Binh and Quang Nam, over 80% of people support reducing the use of SUP to limit the amount of plastic waste generated, of which about 60% have classified plastic waste for reuse or sold to recycling units. The two products with the highest support for limiting use are plastic water bottles (91.84%) and foam boxes/plastic food containers (88.78%). In addition, 90% of people also support bringing personal items (water bottles, toothbrushes, hair combs, etc.) for multiple use when traveling. However, similar to other groups, the rate of people's understanding of regulations related to the roadmap for banning the use of SUP is still very low, with 70-80% not knowing about these regulations.

4.3. Limitations and challenges in eliminating SUP use

In recent years, although there have been many efforts in both policy and implementation, in reality, reducing PW in general, and reducing the use of SUP and PW in the tourism industry in particular, still has many limitations. The results of this study show that reducing the use of SUP in tourism in the two provinces of Quang Nam and Ninh Binh still has many challenges.

Firstly, the awareness of residents, tourists, and tourism businesses about the legislation on phasing out the use of SUP is still limited, the use of SUP and non-biodegradable plastic bags has become a habit that is difficult to change. Specifically, only 31% of accommodation establishments, 40% of travel agencies, 29.03% of people in tourist areas, and 23.87% of domestic tourists know about the legal regulations on the roadmap to ban the use of SUP (Fig. 5). Failure to grasp the legal regulations will greatly affect the management as well as the implementation of activities to reduce plastic waste from single-use plastic products in the tourism sector in particular and waste management in general.

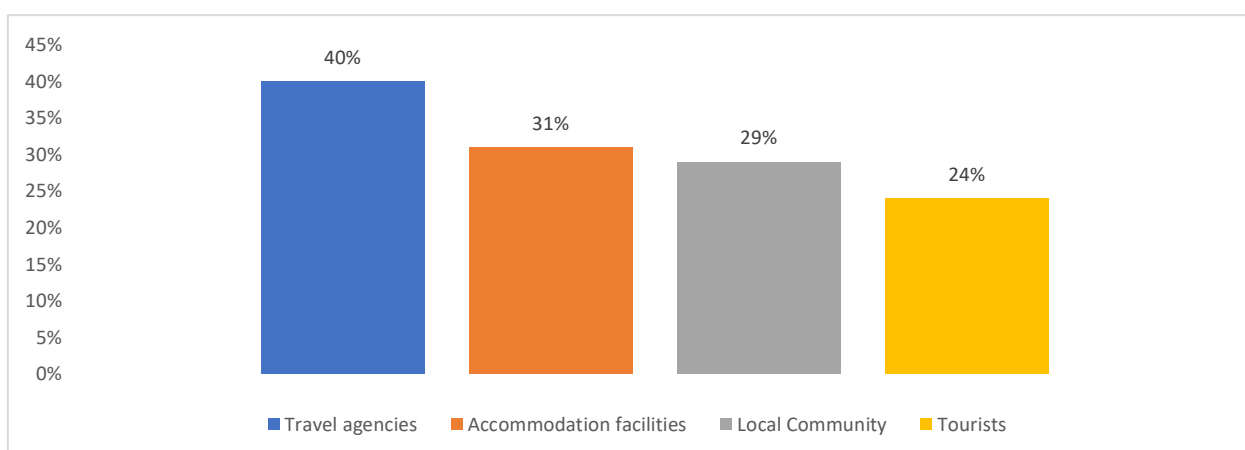


Fig. 5. Awareness of residents, tourists, and tourism businesses on legal regulations on reducing SUP use

Secondly, the use of SUP in the tourism sector in the two research localities is still high, increasing PW and posing a challenge to sustainable tourism development. The survey results show that 100% of tourism businesses, 100% of tourists, and 100% of surveyed people regularly use SUP. For tourism businesses, using plastic bottles, plastic cups and straws, and nylon bags in the offices of travel agencies is quite common. On tours, the main types of SUP used are water bottles towels, and wet tissues. At accommodation establishments, plastic water bottles, plastic bags, plastic bottles containing shampoo, shower gel, plastic toothbrushes... are used more than other SUP. For tourists, plastic water bottles; foam /plastic boxes; knives, scissors, spoons, and plastic forks are the most used types of SUP. Domestic tourists still use a large amount of SUP with about 1.97 plastic bags/person/day; 1.42 wet tissues/person/day; plastic bottles/per person and about 2.92 plastic bags/person/day, while international tourists use a lot of plastic bottled water with 4.17 bottles/day/person, and personal care items provided in hotels such as razors, hair caps, combs... This result is similar to a study by the World Bank (2022) which showed that at tourist destinations, styrofoam food containers, plastic bags, plastic straws... are in the top 10 plastic items at tourism coastal sites (World Bank Group, 2022).

Thirdly, the reduction of SUP use and PW minimization among tourism businesses, tourists, and people is not effective. Programs/projects and initiatives to reduce PW have not been implemented continuously and regularly and have not been effective in many places. Accordingly, only 20% of accommodation establishments and 21% of travel agencies out of the total number of businesses surveyed have applied PW minimization initiatives. New PW reduction models are experimental and have not been popularized or replicated. About 45% of tourists and 10% of people are still not ready to participate in PW minimization activities (Fig. 6).

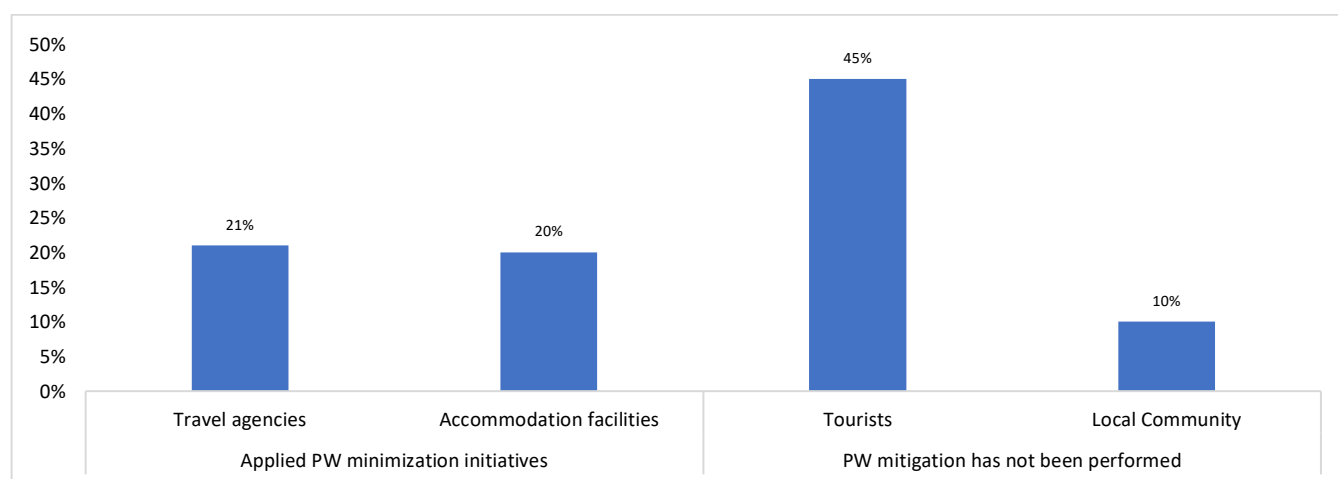


Fig. 6. Reducing SUP use and minimizing PW among travel agencies, tourists, and local communities

Fourthly, tourism businesses still face difficulties when applying alternative SUP solutions. Specifically, about 62.57% of accommodation establishments and 62% of travel agencies confirmed a lack of financial resources; 56.15% of accommodation establishments and 64% of travel agencies faced difficulties in human resources to reduce the use and replace SUP. In addition, about 31.02% of accommodation establishments and 28% of travel establishments said that they lacked information about suppliers of products that could replace SUP in its action (Fig. 7). These are also common difficulties of most tourism businesses in some countries such as Greece, Italy, France and Spain (Bauske and von Münchhausen, 2019)

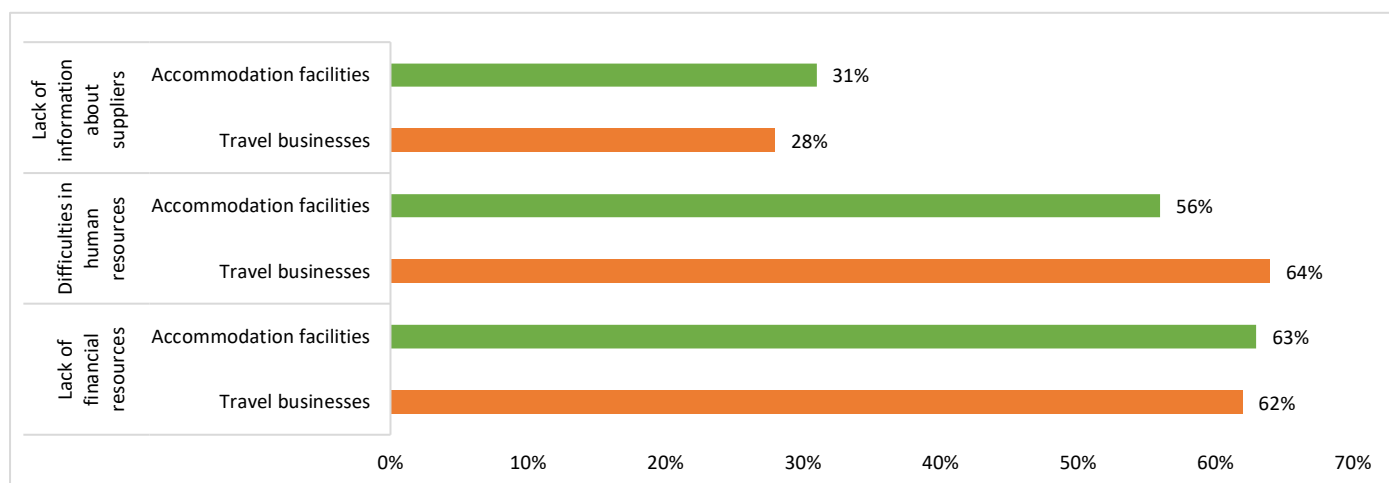


Fig. 7. Difficulties encountered by tourism businesses when applying SUP alternatives

Fifthly, the legal documents on SUP management for the tourism industry are still incomplete. Although the roadmap for eliminating SUP has been issued by the law on environmental protection, however, the tourism sector's policy has not mentioned it clearly and specifically. The tourism industry has no action plan for reducing SUP and a roadmap for eliminating SUP. There are no assessment criteria for reducing SUP in business establishments, accommodation services, and other tourism services; tourism service establishments, when building management regulations, also do not have specific content on SUP management. The coordination between the Ministry of Natural Resources and Environment and the Ministry of Culture, Sports, and Tourism on environmental protection in general, and SUP management in particular, is not yet close and synchronous.

4.4. Recommendations for reducing the use of SUP

Along with economic and social development, improvements in living standards and infrastructure will drive Vietnam's tourism sector to grow strongly in the coming years. According to the Vietnam National Tourism System Plan (Vietnam National Administration of Tourism, 2024), it is forecasted that by 2030, the number of tourists will increase to about 196 million, including 35 million international visitors and 160 million domestic visitors, and the demand for accommodation will also increase to about 2 million rooms; travel agencies are also growing strongly in number and scale. This will increase the use of SUP, thereby enhancing the generation of PW in tourism, which is a significant challenge in achieving the sustainable development goals by 2030. Based on the results of this study, several solutions are proposed below for tourism management agencies, environmental management, tourism businesses, and tourists nationwide, as well as in Ninh Binh and Quang Nam in particular.

Firstly, continue to raise awareness on legislation on reducing and eliminating SUP in the tourism sector. The Department of Culture, Sports and Tourism (DCST) of the two provinces, Ninh Binh Tourism Association and Quang Nam Tourism Association, need to continue to coordinate with the Department of Agriculture and Environment (DAE) to carry out communications to encourage the community and tourists to limit the use of SUP or hard-to-decompose plastic bags. Communication activities should be targeted at tourism services businesses in the Hoi An ancient town (Quang Nam) and, boat rowers in the Trang An Ecotourism Complex and the Van Long Nature Reserve (Ninh Binh Province). DCST should organize seminars and training sessions and disseminate regulations of the Law on Environmental Protection, Decree 08/2022/ND-CP, on the roadmap to eliminate plastic bags and SUP in accommodation establishments and tourist areas and initiatives to end plastic pollution and create a circular economy. Build a culture of environmental protection; reduce the use of SUP in tourist establishments; raise awareness; train and coach staff of tourism businesses; convey messages about reducing the use of SUP to tourists when using services at accommodation establishments. Organize rewards and honors for tourist

areas, destinations, and businesses that successfully implement the SUP reduction model, such as those in Cu Lao Cham. Organize campaigns to reduce waste for businesses and communities near tourist areas/destinations.

Secondly, strongly promote the reduction of SUP in tourism in Ninh Binh and Quang Nam by developing green and sustainable tourism. The Departments of Culture, Sports, and Tourism of Ninh Binh and Quang Nam need to popularize and promote the development of green tourism products that reduce waste and build green tourism destinations by issuing criteria and establishing certification organizations. It is necessary to mobilize and advise tourism businesses and services to commit and implement the cessation of SUP use and the reduction of waste, especially in key tourist destinations such as Van Long, Trang An (Ninh Binh...), and Hoi An (Quang Nam). Promote and further expand green and sustainable tourism models that are free of plastic waste, such as Silk Sense Hoi An River Resort (Quang Nam), Thung Nham Ecotourism Area, and Trang An (Ninh Binh). Promote the role of tourism associations in developing and implementing plans, programs, and projects to eliminate SUP and reduce waste in the local tourism industry. Develop experiential tourism programs, typically involving the creation of recycled products from used plastics, in collaboration with local communities.

Thirdly, develop, promulgate, disseminate, and implement guidelines for reducing SUP use and minimizing PW in tourism. It is necessary to create and disseminate good practice guidelines on reducing the use of SUP, managing and reducing PW in tourism for accommodation establishments, travel establishments, destinations and festivals, and tourists). These guidelines should focus on reducing the use of common types of SUP for each type of object: (i) For accommodation establishments - plastic water bottles, plastic bags; (ii) For travel establishments - plastic bottles, cups and plastic lids, and plastic bags in the office and water bottles and towels, wet tissues on tours; (iii) For tourists - plastic bottles and plastic bags. Tourism businesses need to develop regulations for managing and reducing single-use plastics (SUP) and plastic waste (PW) in their establishment's management regulations, increase training, and disseminate guidelines on reducing the use of SUP and PW to staff, employees, tour guides, and other relevant personnel.

Fourthly, create conditions, support, and encourage tourism businesses to gradually reduce and eventually eliminate the use of single-use plastics (SUP) in their operations. The Department of Culture, Sports, and Tourism of Ninh Binh and Quang Nam need to organize programs to promote, advertise, and introduce tours, suppliers, and destinations (hotels, restaurants, shopping spots, tourist attractions, etc.) that do not use SUP or are good examples of reducing SUP and SUP. Organize training, coaching, guidance, and experience-sharing initiatives; disseminate and replicate best practices, management experiences, and green tourism models; and reduce waste in the tourism sector. Strengthen the development, dissemination, and provision of information on sustainable product alternatives to tourism businesses and services; guide the selection of environmentally friendly product suppliers in the tourism sector and the application of sustainable product alternative solutions. Strengthen international cooperation and mobilize domestic and foreign resources to support activities that reduce the use of single-use plastics (SUP) and waste in the tourism sector. Strengthen coordination between management agencies, local tourism authorities, tourism businesses, and other stakeholders to invest in and promote waste reduction activities. Organize advocacy and provide consultation for tourism businesses and service providers to commit to and implement plastic waste reduction, with a focus on key tourist destinations (Ninh Binh, Hoi An–Quang Nam).

Fifthly, the system of policies and laws on SUP elimination should be improved to minimize PW in the tourism industry. At the national level, the Ministry of Culture, Sports and Tourism needs to develop and promulgate an action plan to reduce plastic waste in the tourism industry as well as a coordination regulation between the Ministry of Natural Resources and Environment and the Ministry of Culture, Sports and Tourism on environmental protection, including coordination on plastic waste management. It is necessary to revise and supplement the content on plastic waste reduction in green tourism standards, as well as standards for ranking hotels, tourism businesses, and green tourist destinations and criteria for green tourists. Develop and apply specific sanctions for handling violations of plastic waste management in the tourism sector. Conduct inspections and supervise the implementation of legal regulations aimed at eliminating single-use plastics and non-degradable plastic bags

in hotels and tourist areas. Effectively implement incentive and support mechanisms to stimulate the production of SUP replacement products and the application of recycling technology.

These 05 solutions for SUP reduction should also be implemented through both short-term and long-term roadmaps to ensure their effectiveness. For the short-term, priority solutions in Ninh Binh and Quang Nam include: (1) Limiting and replacing SUP in restaurants, hotels, and tourist destinations such as Trang An, Tam Coc, Van Long (Ninh Binh), and Hoi An (Quang Nam); not providing plastic straws, plastic bags, etc., and instead using alternatives such as paper straws and cloth bags at tourist sites; (2) Encouraging reuse by calling on tourists to bring their own personal bags and water bottles; installing water purifiers/refill stations so visitors can refill their bottles at tourist destinations or during tours, especially in Hoi An and Trang An complex, and; (3) Raising awareness and organizing communication campaigns for tourists, tour guides, travel agencies, and accommodation providers. In the long-term, strategic solutions should be implemented, such as (1) Issuing regulations to ban or restrict the use of SUP in tourism establishments in Quang Nam and Ninh Binh; requiring tourism businesses in both provinces to develop regulations or plans to reduce SUP; (2) broadly promoting commitments from tourism businesses to reduce plastic waste; (2) Providing training and disseminating guidelines on SUP reduction for staff, employees, and tour guides; (3) developing green products such as community-based tourism models with zero plastic waste in Hoi An or the Trang An Ecotourism Area, and expanding the "zero plastic waste" model of Cham Islands to all of Hoi An.

The authorities of Quang Nam and Ninh Binh provinces need to develop a plan to reduce plastic waste in the tourism sector based on the National Action Plan on Plastic Waste Reduction and recommendations of the Vietnam Tourism Association; by 2030, 100% of tourism service establishments in Quang Nam and Ninh Binh provinces will not use disposable plastic products; 100% of establishments will issue guidelines/plans to reduce plastic waste or integrate the content of reducing plastic waste into regulations/operation plans.

5. CONCLUSIONS

Along with population growth and socioeconomic development, solid waste generation in Vietnam, including plastic waste, continues to increase. The tourism industry is negatively impacted, but it is also a significant source of plastic waste, primarily from the use and disposal of SUPs. Therefore, reducing the use and disposal of SUP in tourism is vital in solving plastic waste pollution.

Research results in Ninh Binh and Quang Nam show that SUP is still widely used in the tourism sector. Tourists still use SUP in large quantities, about 3.64 plastic bottles/day and about 1.48 plastic bags/day; each 4-5* hotel room consumes about 240 plastic bottles/year; the use of SUP in travel agency offices is also quite widespread, mainly plastic bottles, plastic bags, foam boxes, in tours, the types of SUP used are mostly plastic water bottles about 2,700 bottles/year and wet towels about 480 pieces/year. Regarding the awareness and behavior of stakeholders, up to 75% of tourists support limiting the use of single-use plastics (SUP); over 60% of accommodation establishments have classified plastic waste (PW) and are willing to choose suppliers who are responsible for the environment; 75% of travel agencies have classified waste and PW. However, reducing the use of SUP still faces numerous challenges, with approximately 60% of tourism businesses citing a lack of financial and human resources and 30% stating they lack access to alternative SUP products.

In Vietnam, a roadmap has been established to eliminate all types of SUP by 2030. However, the legal policy system is incomplete; the tourism industry has not yet issued documents on reducing SUP and eliminating SUP. The awareness of the majority of people, tourists, and tourism businesses regarding the roadmap for lowering SUP use in Ninh Binh and Quang Nam remains limited; consequently, the use of SUP in the tourism sector in these two localities remains high, contributing to increased SUP generation. Although numerous initiatives and activities have been implemented, the reduction of SUP use and the development of alternative products have not been effective; businesses still face challenges in finance, human resources, and the adoption of new products. Therefore, in the coming time, it is necessary to continue propagating, raising awareness,

and disseminating policies and laws aimed at reducing and eliminating SUP in the tourism sector. Strongly promote SUP reduction in tourism in Ninh Binh and Quang Nam through developing green tourism and sustainable tourism; develop, promulgate, disseminate, and implement guidelines for SUP reduction and PW reduction in tourism; facilitate, support, and encourage tourism businesses to gradually reduce and eliminate the use of SUP in their operations; and; perfect the system of policies and laws on SUP elimination to minimize PW in the tourism industry.

Due to time and budget constraints, the results of this study are not yet complete and comprehensive. Further research is needed in other tourist areas and destinations in Vietnam to promote the reduction of tourism waste in the future.

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