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PARTIES AND THEIR ROLES IN SOLID WASTE SEPARATION AT THE SOURCE: AN EXAMPLE FROM MALAYSIA'S AWARD-WINNING RESIDENTIAL AREA

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Abstract: *In September 2015, the Malaysian government enforced solid waste separation at the source, requiring every household to separate its solid waste. This effort requires cooperation and support from all community members and other parties. The objective of this study is to determine which parties were involved and to identify their roles in the successful implementation of solid waste separation at the source. Interviews and focus group discussions were used in data collection methods. Transcribed records were analyzed using content analysis. The findings reveal that the cooperative nature and commitment of all parties involved (residents, local and state government agencies, and vendors) are key factors in the successful implementation of solid waste separation at the source at one of the top three national award-winning residential areas in Malaysia. Further exploration of these key success factors is warranted.*

Keywords: *Solid Waste, Solid Waste Separation at the Source, Household, the Role of the Parties Involved, Success Factors*

Introduction

Malaysia is an emerging economy that is working towards developed nation status by the year 2020 in order to put the country on par with developing countries such as Japan and the United States. In the face of pressure leading up to 2020, there are certain issues that need to be addressed by the government; the growing amount of solid waste (Saeed et al., 2011; Kathiryale et al., 2003). Based on the records of the people in the Jabatan Perangkaan Malaysia/Department of Statistic Malaysia (DoSM) the population in Malaysia as a whole, including Sabah and Sarawak, in 2016 was estimated at 31.7 million, reflecting an increase of 0.5 million compared to 31.2 million in 2015, or a 1.5 percent annual growth rate (DoSM, 2016). Ali et al. (2012) mentioned that a growing population would affect the increase for waste.

Table 1: The generation of solid waste in Peninsular Malaysia (JPSPN, 2014)

Year 2005	Year 2012	Current 2014	Estimated Upcoming Year 2020
19,000 tons/per day	33,130 tons/per day	Approximately 36,000 tons/per day	50,000 tons/ per day

Table 1 shows the generation of solid waste in Peninsular Malaysia in 2005, 2012, and 2014 and estimates for 2020. The total amount of solid waste in 2012 increased to 33,130 tons per day, compared to 19,000 tons per day in 2005. Based on statistical studies conducted by the Jabatan Pengurusan Sisa Pepejal Negara (JPSPN), the amount of solid waste generated in the country is becoming increasingly alarming; in 2014, JPSPN found an increase of 36,000 tons per day. As a result of the study, JPSPN expects waste levels will continue to increase up to 50,000 tons per day by 2020 (JPSPN, 2014).

Table 2: Solid Waste Composition Records in 2014 (JPSPN, 2014)

Components	Percentages (%)
Organic Waste	44.5
Plastic	13.2
Disposable diapers	12.1
Paper	8.5
Garden Waste	5.8
Other waste (Glass and Ceramics, Clothes, Metal, Tetra Pak, Rubber, Leather, Wood and Hazardous Waste)	15.9
Total	100

Table 2 lists the components recorded in solid waste in 2014. Organic waste is the largest component at 44.5%, followed by plastic at 13.2%, disposable diapers at 12%, paper at 8.5%, and garden waste at 5.8%. Additionally, the components of other waste containing glass and ceramics, clothes, metal, Tetra Pak, rubber, leather, wood and hazardous waste is significant at 15.9%, it is clear that organic waste has the highest percentage compared to other components. Generally, households generate most of the organic waste.

In order to reduce the generation of solid waste, the government, through the Ministry of Housing and Local Government, has taken steps to introduce a new approach known as solid waste separation at the source (Bernama, 2015). The government has made it mandatory for every household to separate its solid waste beginning 1 September 2015. According to Act 672, the implementation of waste separation at source was carried out in stages in Pahang, Johor, Melaka, Negeri Sembilan, Perlis, Kedah and Wilayah Persekutuan Kuala Lumpur and Putrajaya (Akta 672).

As mentioned by Matter et al. (2013) waste separation at the source is one-step to reducing the amount of waste at the source. This step involves a process of separating wastes according to the appropriate category of solid waste, such as plastic, paper, ceramics, glass, aluminium, metal, electronic waste, and hazardous waste. Another category is organic waste, disposable diapers and others. The process of solid waste separation should occur at an early stage such that households who are living in the residential areas can identify the type of solid waste before throwing it into the recycling or rubbish bins (Enayetullah and Hashmi, 2006).

Othman (2010) mentioned that any waste, whether or not it can be recycled, should be separated before being collected and taken to a landfill. In the face of limited landfill space, solid waste separation is seen as a measure to solve the waste problem. In addition, landfills are no longer able to accommodate the amount of waste that is increasing day by day.

Therefore, the objective of this study is to identify the parties involved and their important roles in solid waste separation at source at Taman Sri Merbuk, Jalan Tokai, Pendang, Kedah.

Methods

Study Area

The area of this study is Taman Sri Merbuk, which is located in Majlis Daerah Pendang, Kedah, bordered by Majlis Daerah Padang Terap and Majlis Daerah Sik in the East, Majlis Daerah Kota Setar and Majlis Daerah Pokok Sena in the north while District of Yan is in the West and Majlis Daerah Kuala Muda is in the south. In 2015, Jabatan Perangkaan Malaysia forecasted the resident population in Pendang to be approximately 104,800 people and estimated that it will increase to approximately 136,482 in 2020. In addition, this area is included in Mukim Bukit Raya.

Figure 1: The Location of Majlis Daerah Pendang and Other Majlis Daerah in Kedah Darul Aman

Figure 2: The Study Area

Data Collection

This study was conducted by using primary and secondary data. The secondary data were collected from previous journals, articles, reports, newspapers, websites and other sources. For primary data, this study used qualitative method (interviews); group and individual. Primary data collection involved respondents (interviewees) who have experienced and knowledge in the topic studied (Bluhm et al., 2011) (solid waste management; waste separation at source).

The group interviews (focus group), have a minimum of three respondents involved (Twohig and Putnam 2002). To facilitate adequate data collection and the emergence of themes across and between groups, two groups were interviewed (Halcomb et al. 2007). In order to gain deeper understanding and further explain the topic, an interview with the Majlis Daerah Pendang was conducted.

This homogeneous sampling brings together people of similar backgrounds and experiences (solid waste management; waste separation at source) in order to reduces variation, simplifies analysis, and facilitates group interviewing (Patton, 2001).

Table 3 shows the respondents' profile for this study. The interviews involved a personal from the Majlis Daerah Pendang, and two focus group discussion with five (5) representatives from Solid Waste Management and Public Cleansing Corporation (SWCorp) of Negeri Kedah and eight (8) resident's representatives from Taman Sri Merbuk. The instruments used to record the interview include interview forms, a sound recorder, and a camera recorder.

Table 3: Respondents' Profile

Respondents (R)	
R1	Majlis Daerah Pendang
R2, R3, R4, R5, and R6	SWCorp Negeri Kedah
R7, R8, R9, R10, R11, R12, R13, and R14	Residents Of Taman Sri Merbuk

All data and information were analyzed qualitatively by using content analysis. According to Krippendorff (2004), content analysis is an analytical method for qualitative data such as interview data. This method was selected because all the data obtained were in the form of

statements, explanations and opinions and insights. Content analysis is a research technique used to create replicable conclusions from data.

The analysis of the study consists of Part A and Part B. Part A explains the first objective of the study, which is to clarify the role of the parties involved in the implementation of the solid waste separation in Taman Sri Merbuk.

From this study, we will be able to identify the real parties responsible in carrying out the solid waste separation in the study area. Part B explains the second objective, which is to identify the success factors of the implementation of solid waste separation at source in the study area. This analysis will clarify whether or not the factors derived from the literature review are verified and agreed by the respondents.

Findings and Discussion

The Parties Involved and Their Important Role in Solid Waste Separation at the Source at Taman Sri Merbuk, Jalan Tokai, Pendang, Kedah.

Community of Taman Sri Merbuk

According to R1, all residences must have knowledge of how to separate solid waste properly so that they can contribute to the success of the solid waste separation. R7, R8, R9, R10, R11, R12, R13 and R14 mentioned that every household must separate and dispose of solid waste in the right category before it is collected by solid waste management. Furthermore, R9 and R14stressed that glass waste, paper, dry and wet as well as other wastes such as plastic bottles and garden waste should be disposed of separately according to the appropriate category of proper waste collection to facilitate easy operation by the Environment Idaman Sdn. Bhd. R11 mentioned that through this responsibility, it can ensure the health of local residents.
According to R7 and R11, the wet waste that was consigned must be put into the rubbish bins provided at the front of the house while waiting for the day of collection. Packaging waste recycling should be wrapped and placed at the edge of the bins. R9 emphasizes that residues and waste recycling must be separated before being collected on different days through the 2 + 1 system. Residues should be wrapped in plastic and placed in the bins in front of the house while recycling should be included in the correct category in the recycling cage provided in Taman Sri Merbuk.

Majlis Daerah Pendang (MDP)

This role refers to the obligations undertaken by the MDP in solid waste separation in the area. R1 has stated that the role of local authorities is at the level of commitment and cooperation and in any form that involves solid waste separation under SWCorp. It is supported by R8 and R10 with emphasis on the importance of solid waste separation in the campaign, and the need for it to be upgraded again to provide deeper insight into the local population. Each agreed that the MDP should expand activities of this kind to help SWCorp. Additionally, if there are residents who engage in renovation, R7 stated that the MDP will monitor and ensure that residues resulting from renovation waste such as excess sand will be dumped in the proper place. R2 has also agreed by saying that local authorities must cooperate with SWCorp by permitting them to strategically place recycling cages at the right locations.

R1 has stressed that the role of providing financial contributions to the solid waste separation program is part of the MDP scope. However, the financial allocation is not reserved exclusively for carrying out activities in the separation of solid waste in a residential area. MDP will allocate

this contribution to certain residential areas to carry out activities such as *gotong-royong* and other activities.

SWCorp Negeri Kedah

SWCorp is responsible for regulating and monitoring the solid waste collection. R1 stressed that local authorities no longer exercise the responsibility of solid waste management and that public cleansing was acquired and monitored by SWCorp. R5 and R1 has consented to the statement and said that beginning 1 June 2016, SWCorp has been monitoring its operations conducted by enforcement personnel, who were required by SWCorp to conduct the separation of solid waste across all premises and neighbourhoods. This statement has been supported by R2, R3, R4 and R6.

R9 also stressed that SWCorp has been regulating solid waste collection, as can be observed from how garbage collection is done quickly and accurately and according to the schedule.

R1 stated local authorities would provide full cooperation and commitment to any program that involves the separation of solid waste under the auspices of SWCorp. It explains that SWCorp is responsible for carrying out programs involving the separation of solid waste. R5 also mentioned that the purpose of the campaigns is to attract the local community or residents to separate any solid waste before it is discharged.

Residents Association of Taman Sri Merbuk, Jalan Tokai

According to R9, after the establishment of the Association of Residents of Taman Sri Merbuk, Jalan Tokai, these associations have been active in carrying out their responsibilities and played an important role to ensure that residents benefit from the solid waste separation. For example, this particular residential area has won the competition for a clean residential area. R12,R8 and R9 also agreed with the above statement. For those who fail to separate their solid waste before it is disposed of, the association will meet with the residents and advise them. R8 and R11both agreed that the cooperation between the members of residents' associations and residents should be described as admonishing and providing guidance to those who are less familiar with appropriate ways of separating solid wastes. R7, R10, R13 and R14 have agreed and supported the statement of the other respondents. In addition, residents' associations in collaboration with other residents often organize *gotong-royong* to clean up the area.

R7 also mentioned that if there are residents who stubbornly refuse to separate solid waste, this association will make a complaint to SWCorp for further action. In addition, based on group discussions conducted, R9 stressed that if there is a delay of solid waste collection by E-Idaman in the study area, the residents' association will complain directly to SWCorp. Residents' associations will ensure the concessions operate garbage collection according to a predetermined schedule.

Environment Idaman Sdn.Bhd.

R2 and R5 stated that in principle the garbage bins in residential units are provided by the concession. It is the responsibility of the concession and is fully monitored by SWCorp. Based on ongoing focus group discussions, R5 mentioned that these bins have been specially provided by E-Idaman for the purpose of filling the separated residue. R4 also agreed with this and said E-Idaman is providing bins, cages and plastic recycling.

R2 and R3 mentioned that E-Idaman will conduct operations in accordance with the 2 + 1 waste collection system where wet waste or domestic waste will be collected two (2) times a week, while the recycling waste will be collected once (1) a week. According to R2, compactor trucks

to the Material Recovery Center located in Tajar, Kedah, while compactor trucks and RORO will take domestic waste to the landfill will take all recycling waste. According to the R4, the responsibility of managing solid waste separation is not only on E-Idaman; residents must also cooperate with the management concession for the launch of this system. To summarize the findings and discussion of the first objective of this study, Figure 3 is presented. The figure shows all parties involved and their important roles in the solid waste separation at source at Taman Sri Merbuk.

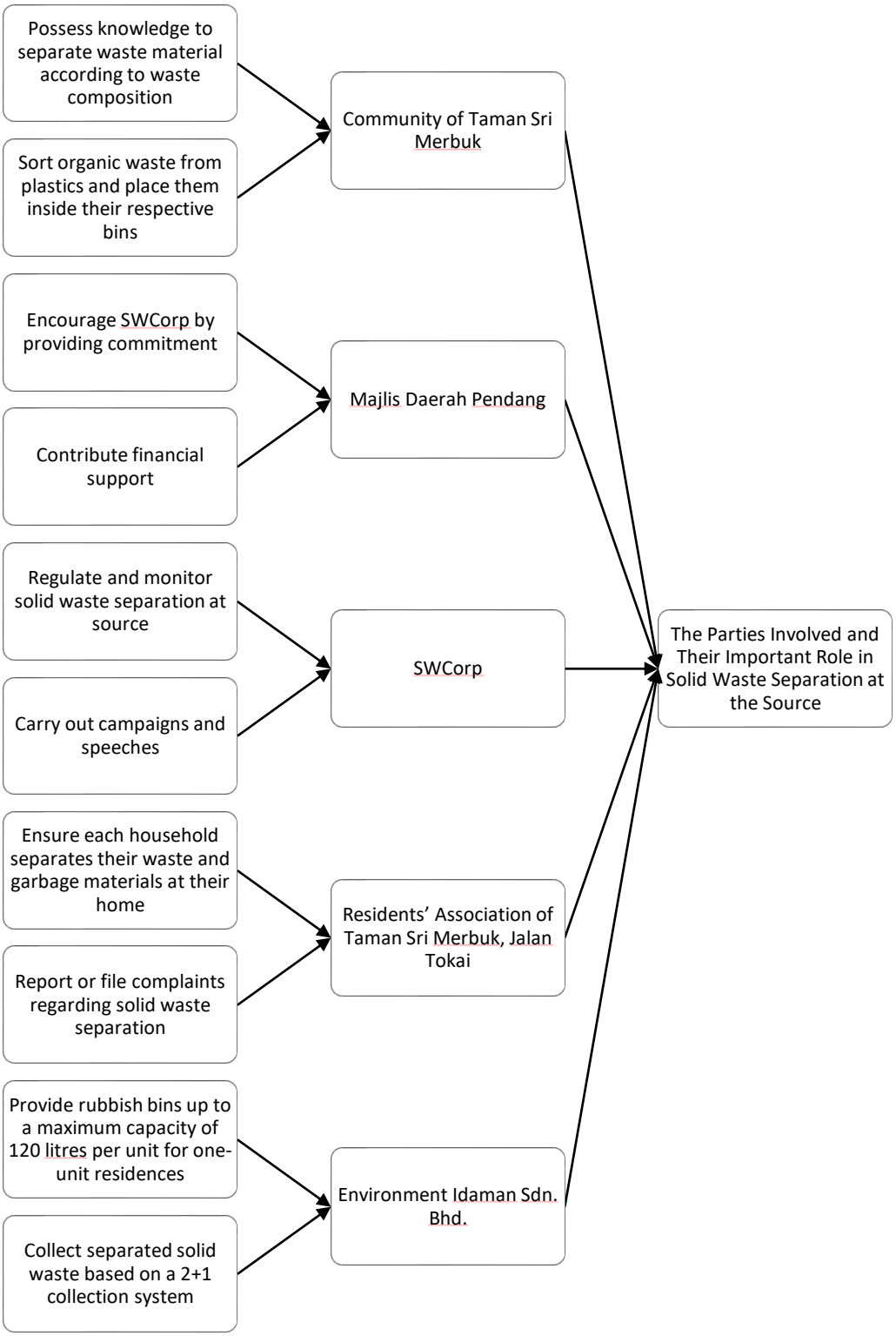

Figure 3: The Parties Involved and Their Important Role in Solid Waste Separation at the Source

The Success Factors of Implementing Solid Waste Separation at Source at Taman Sri Merbuk, Jalan Tokai, Pendang, Kedah.

Active support and involvement from community

The majority of the respondents interviewed agreed that active support and involvement from the community can contribute to successful solid waste separation. This finding is consistent with previous studies conducted by Nek Ali (2012), who stressed that the local community must join all activities and programs organized by SWCorp or the government to show their support and involvement. Successful solid waste separation requires constant support and involvement of all segments of society to ensure the welfare and preservation of the environment. Each of the fourteen (14) respondents agreed with this factor. R1, R2, R3, R4, R5 and R6emphasized the support and involvement of local communities, and in their opinion this factor is very important because it can contribute to the success of the solid waste separation in the study area. Furthermore, R1 believes these factors are macro factors for a successful solid waste separation. In addition, these factors were also supported by R7, R8, R9, R10, R11, R12, R13 and R14.

The local community understands the importance of solid waste separation at source.

Based on interviews and ongoing focus group discussions, thirteen (13) respondents agreed with this factor. To increase community involvement in solid waste separation, every household should understand the importance of separation of solid waste. Furthermore, R1 believes these factors are macro factors for successful solid waste separation. All respondents agreed with this factor except R6, who refused to clarify the understanding that the importance of separation of solid waste in society is still lacking. Although a variety of amenities and facilities have been provided and the issue enjoys publicity across many sources of media, there are still more people who are not aware of this issue and ignore their responsibilities.

An effective awareness campaign and public education program.

This factor received the highest score, with 14 out of 14 respondents agreeing that an effective awareness campaign and public education program is one of the key success factors. The average respondent agreed that public education is an important factor contributing to the success of solid waste separation, since public education can shape a generation that has knowledge and greater awareness of the environment (Razak, 2015). This finding is also consistent with previous studies conducted by Jamilah et al. (2011) which mentions this point. This factor has been considered in educating the public to appreciate solid waste as a resource that can be recycled, thus helping to reduce the amount of solid waste sent to landfills. As such, all respondents agreed that these factors are important in contributing to the success of solid waste separation in the study area.

Provide good equipment and facilities to manage solid waste separation at source.

Each of the 14 respondents also agreed that providing good equipment and facilities to manage solid waste separation at source is also one of the key success factors. This finding can also be seen in the previous studies conducted by Abdullah et al. (2013). All respondents who were interviewed agreed with this factor. Through the executive power granted to them, SWCorp has upgraded the provision to include more technologically sound equipment in launching its solid waste management operations, such as providing garbage bins with capacity of 120 liter for each dwelling unit, cage recycling, and so on.

Provision of this kind could also encourage households to separate waste in their homes. R1 also stresses the importance this point and believes that this is one of the macro factors in the success of solid waste separation.

Solid waste is collected from house to house according to fixed-schedule.
All respondents agreed that this factor could affect the successful implementation of solid waste separation in the study area. This factor is also mentioned in the previous study conducted by Vanessya (2003), which explains that the successful implementation of a solid waste collection system in the area depends on the frequency of work carried out by the concession. For Taman Sri Merbuk, SWCorp appointed Environment Idaman Sdn. Bhd. to undertake the management and solid waste collection from house to house. A permit is required to carry out this operation according to the schedule set up by SWCorp, in which domestic waste will be collected on Tuesdays and Saturdays while the recycle waste and garden waste will be collected on Monday.

To ensure that the concession exercises this responsibility, SWCorp will make concessions to send a full report of solid waste management and public cleansing on a monthly basis. R9 emphasized this factor as a key success factor in solid waste management; according to respondents in the study area, as long as there is no problem and the collected waste is not stored for a long time, this process should run smoothly. According to R9, the residents in this area will usually be willing to separate their residues and recyclable waste into the appropriate garbage bins, which will then be collected and stored at the side of the bins before collection days. It was found that this factor is very effective in contributing to successful solid waste separation in the study area.

Findings and discussion for objective 2 of this study are summarized in Figure 4. Five success factors of implementing solid waste separation at the source were found through this study.

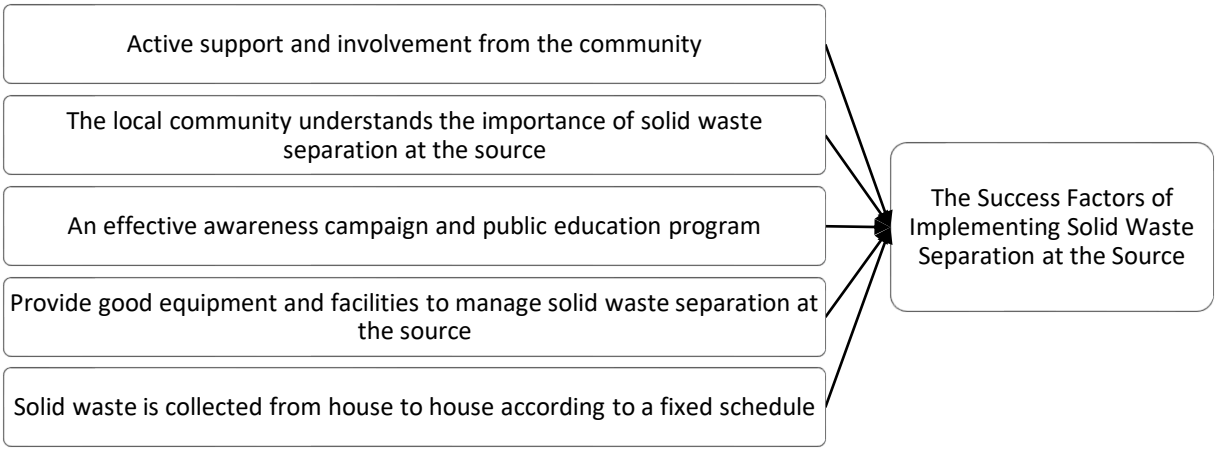

Figure 4: The Success Factors of Implementing Solid Waste Separation at the Source

Conclusion

In conclusion, this study focuses on the role of the parties involved and the success factors that can be shared in terms of its implementation in other regions. Based on the results, it can conclude that the implementation of the solid waste separation at source at Taman Sri Merbuk, Jalan Tokai, Pendang, Kedah is operating successfully. According to interviews and focus group discussions with respondents, the authors found that there are five (5) parties involved in various roles in solid waste separation at source at Taman Sri Merbuk, Jalan Tokai, Pendang, Kedah. They are the community of Taman Sri Merbuk, Jalan Tokai, Majlis Daerah Pendang, SWCorp, Resident's Association and Environment Idaman Sdn. Bhd., and five (5) success factors that have influenced the implementation of solid waste separation at source in Taman Sri Merbuk, Jalan Tokai. We recommend that the implementation of solid waste separation at source should be continued and expanded, not only in states reference din Act 672 but also in all states in Malaysia.

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