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Content

Factors Affecting the Tourists' Arrival at Botanical Gardens in Sri Lanka (Peradeniya and Henarathgoda Botanical Gardens)

Manjula Gunarathna[1]

Abstract

Currently, tourism is recognized as an emerging industry worldwide. Due to the wide variety of purposes and preferences that tourists have, the industry has grown exponentially over the years, branching out into different areas among which eco-tourism plays a significant role. In Sri Lanka, the tourism industry plays an undisputable role in the country's economic growth. However, it can be observed that the contribution of botanical gardens to the development of the Sri Lankan tourism industry has not been acknowledged by the contemporary studies that concern the industry. Therefore, this study aims to identify the prominent factors that influence the change in tourist arrival in both Peradeniya and Henarathgoda botanical gardens. The present study aims to understand the impact of the factors on tourist arrivals to the selected gardens through a sample of 75 local and 25 international tourists, who were selected via an on-site survey. The results of the exploratory factor analysis revealed that gender and age group are the most influential variables that showed different agreement levels in the Peradeniya Botanical Garden, whereas age group, gender, and educational level demonstrated different agreement levels in the Henarathgoda Botanical Garden. The research identified five factors that significantly influenced tourist visits in the Peradeniya botanical garden including external facilities, natural environment, garden environment, transportation and communication, and safety. Similarly, in the Henarathgoda botanical garden, four factors were identified as influential: facilities, transportation, security, parking, sanitation, and natural attraction.

Keywords: Botanic Tourism, Botanical Gardens, Factors, International Tourists, Local Tourists

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1. Introduction

The tourism industry, unlike other economic sectors, is heavily impacted by challenging socio-economic and political circumstances (Daoudi, 2000). Its high sensitivity to these forces has given it such an exposed position that it already serves as an early warning indicator of critical situations for other sectors (Daoudi, 2000). Tourism garnered high popularity in the decade of 1960 among third-world countries while being recognized as a new opportunity for those nations to secure foreign exchange that stimulated economic growth (Kadt, 1981). According to Kadt (1981) "their sunny climates, sandy beaches, and exotic cultures attracted a stream of vacationers, and resorts multiplied to meet the demand" (p. 14). Botanical Gardens represent the history and the culture of the nations of which they are part of (Shin, 2013).

As Goeldner and Ritchie (2009) argued, "Tourism is a composite of activities, services, and industries that deliver a travel experience that ranges from transportation, accommodations, eating and drinking establishments, shops, entertainment, activity facilities, and other hospitality services" (p.12) which are been made "available for individuals or groups that are traveling away from home". As the United Nations World Tourism Organization (UNWTO) points out, "International tourism comprises the activities of persons traveling to and staying at places outside their usual permanent places of residence for a period not exceeding 12 months for leisure, business, and other purposes" (p.13). However, these visitors do not intend to make a profit in the place they visit (SERIC, 2010). On the other hand, World Tourism Organization (WTO) (2001), observes tourism through rather a general viewpoint, arguing that it moves beyond the common perception of tourism as being limited to holiday activities, i.e., only as people traveling to and staying in places outside their usual environment for not more than one consecutive year for leisure, business, and other purposes (UNWTO, 2001). Viewed in this light, tourism stands as one of the most important sectors in the world economy, as it intersects almost all the areas of a nation's economic success. Furthermore, the varied impact tourism has on different countries is most acutely felt in the region of South Asia as it has become a central pillar in their economic journey (Shin, 2013).

In 1966, Sri Lankan government established a new lead tourism entity, the Ceylon Tourism Board, with the mandate of "revitalizing the industry and turning the country into a modern tourist destination" (Sri Lanka Tourism Development Authority - SLTDA, 2001, p.12). Visitor numbers saw a dramatic increase following its establishment, largely driven by the country's numerous beach resorts. Tourist arrivals to Sri Lanka grew by 24% annually, between the years 1976 to 1982 (SLTDA, 2001). However, With the civil war that broke out in July 1983, the country entered a period of marked decline, the impact of which was heavily felt in the tourism industry (Weiss, 2012).

In 2005, Sri Lankan government passed Act No. 38 which is known as the tourism act, replacing the 1966 law that had laid the ground for the development agenda of the Sri Lankan tourism sector for the previous four decades (SLTDA, 2007). The new legislation recognized SLTDA (2007) as the primary tourism development entity of Sri Lanka. SLTDA was established under the umbrella of the Ministry of Tourism and Sports, which is referred to as the Ministry of Tourism Development and Christian Affairs after the parliamentary elections in 2015. Several additional entities were also established during this time which include "the Sri Lanka Tourism Promotions Bureau (SLTPB), Sri Lankan Institute of Tourism and Hotel Management, and the Sri Lankan Convention Bureau" (SLTDA, 2007, p.12). The sustained efforts of SLTDA have helped attract visitors interested in Ayurvedic medicine, ecotourism, adventure sports, arts and crafts, volunteering, spices, and food and shopping to Sri Lanka (SLTDA, 2018).

2. Literature Review

A discussion on the development of the tourism industry of Sri Lanka demands us to engage with its central geographic location which remains a key determinant in its historical evolution. As UNDP and WTO (1993) pointed out, the strategic location of Sri Lanka has allowed the country to immerge as a tourist hub over the past centuries. At the end of the 13th century, Marco Polo introduced Sri Lanka as the "Most Outstanding Island for Travel" after his tours in the country (Fernando, 2017a). According to SLTDA (2011), Sri Lanka has been popularly known among explorers and traders as the "pearl of the Indian Ocean" and "Serendib" over the years. The first visitors to Sri Lanka were pilgrims who visited sacred cities such as Anuradhapura and Polonnaruwa (Fernando, 2017a).

The second largest foreign migration to the lands of Sri Lanka took place during the second world war. Critics identify this time as the second period in the history of the Sri Lankan tourism industry (Anjana, 2011). Unlike other British colonies, Close to 50% of Ceylon's volunteers to the Great War were commissioned as officers. Most of those officers had a previous affiliation to the Ceylon Cadet Battalion, had military experience in the British Army, or were associated with a Ceylon Defense Force Formation. During the Second World War, the troops who were engaged in military operations had been primarily placed in the cities of Kandy and Gampaha. Following its independence in 1948, Sri Lanka's entry into the international tourism market took place in the decade of 1960 (Ranasinghe & Deyshappriya, 2010).

During the colonial era, Sri Lankans managed to develop a stable economy through paddy cultivation and were able to lay claim to a large foreign reserve through exports of coffee, tea, rubber, and other minor export crops (Wickremerathne, 2010). However, with the introduction of the closed economic policy in 1970, Sri Lanka faced with a severe financial crisis resulting from a reduction in the reserves which had sustained trade and tourism in the country. Therefore, this time period saw a rapid decline in the tourist industry of Sri Lanka (Athukorala et al., 2007).

Traditionally, areas such as the natural beauty, comfortable climate, historical and cultural heritage, and religious diversity have been considered as growth potential in the Sri Lankan tourism industry (Perera, 2017). These aspects have been seen as attractions that draw tourists to the country. On the other hand, critics argue that the success of tourism is heavily relies on the security and safety of a country. At present, Sri Lanka is recognized one of the few tourist destinations left in the world with no threat of terrorism (Fernando, 2017b). In addition to that, Sri Lanka is blessed with a coastal belt of 1,500 km, even though its potential has not been utilized effectively to boost tourism. Considering these facts, it can be argued that there is a high potential that exists in the niche segments of tourism in Sri Lanka such as "MICE (Meeting, Incentives, Conferences, and Events) tourism, Health tourism, Eco tourism, Adventure tourism, Leisure tourism, Agro tourism, Cruise and Marine tourism, Village and Urban tourism, railway tourism, and Recreational tourism" (CBSL, 2015, p.124). Among various branches of the tourist industry, ecotourism or botanical tourism continues to emerge as an important area. It is closely related to other branches of tourism such as educational

tourism, urban tourism, and pleasure tourism, botanical tourism thus rests at a central juncture of the Sri Lanka tourist industry as its development can lead to improvements in the other sectors of the industry.

There are over 2500 botanical gardens worldwide which record over 300 million visitors annually (BGCI, 2012). Traditionally, the focus of botanical gardens has centralized on developing the fields of taxonomy and horticulture which have now extended to address wider issues of conservation, "with particular strengths in ex-situ conservation and education" (Donaldson, 2009, p.12).

In Sri Lanka, the highest tourist arrivals are shown in the Peradeniya botanical garden which records a total of 1,525,156 visitors in the year 2019. Among them, there are 412,660 foreign tourists and 1,112,496 local tourists. A closer observation of the Gampaha botanical garden shows 193,264 tourist arrivals in the year 2018. 333 of those tourists are foreigners while 192,934 remain local visitors. These numbers indicate that there is a major gap between tourist arrivals in Peradeniya and Gampaha Henarathgoda Botanical Gardens.

Several social factors have been identified through previous research as having an impact on tourist visits to the botanical gardens. For instance, Crilley (2008) has explored visitor service quality attributes at six Australian city botanic gardens and their importance in influencing behavioral intentions such as recommending the site to others or revisiting the site as the result of a previous visit to a botanic garden. The study identified twenty-three attributes have been influential on tourist visits to the botanical gardens which were then categorized by using factor analysis into four groups which include "aesthetics, engagement and learning, hospitality services and staffing" (Crilley et al., 2010, p. 12). A study by Crilley et al. (2010) that focuses on regional botanical gardens has yielded similar outcomes reaffirming these conclusions. The researchers re-emphasized that aesthetics stands as the critical contributor in predicting tourist visits to botanical gardens.

Another critical factor that is linked to quality visitor service in botanical gardens is visitor safety. Ability to experience a safe ambiance when visiting a garden is recognized as one of the most important factors that affect service quality. As pointed out by Crilley et al. (2010) despite not being recognized as a determinant in motivation and satisfaction levels among visitors previously, safety when engaging in activities at botanical gardens has now emerged as a

key factor, especially among adult visitors. The reason for this renewed attention towards visitor safety is undoubtedly the difficulties they may face when relaxing, enjoying their experience, and connecting with an aesthetically pleasing environment if their safety is not assured. Helping with understanding the significance of a particular site that a tourist visit has also garnered the attention of contemporary researchers to have an impact on the tourist industry that surrounds botanical gardens. In their recent study, Packer, Ballantyne and Hughes (2014) argued that tourists, particularly international tourists, require assistance when understanding the site and its significance within the local culture.

According to Wassenberg (2012), most participants in one of his research studies had indicated a need to transfer the benefits and outcomes of their visits to other areas of their lives such as applying their knowledge about plants or new plant species when making decisions about their personal or business landscape designs and enriching their academic courses. According to Wassenberg (2012) an extensive collection of plants and well-designed garden spaces increase the possibility of introducing visitors to new plants and providing learning opportunities. Viewed in this light, accommodating activities such as guided tours, self-guided tours, and classes, allow visitors to gain additional and in-depth knowledge.

According to Shin (2013), botanical gardens today lead to horticultural and environmental education. An example of this would be the North Carolina Botanical Garden which focuses on educational programmes that include "plant identification, botanical arts, and exercise in nature for all ages" (Shin, 2013, p.42). Moreover, Shin (2013) has used his survey data to argue that tourists regard education programmes that focus on areas such as conservation as essential for tourist experiences. Therefore, with its wide variety of sources, Korean De-Militarized Zone (DMZ) Native Botanical Garden will become an ideal place to indulge such tourist requirements.

Another key economic factor that needs to be considered is the garden's appeal as a tourism attraction which in turn calls for more marketing surrounding botanical tourism (Borsch & Lohne, 2014). Apart from the issues that concern budgetary restrictions, the management of botanical gardens needs to focus on maintaining a clear brand vision and brand identity that utilizes existing botanic spaces to develop a product and segment portfolio matrix that is

matched to experiences sought by visitors (Williams et al., 2015). Certain other issues that need to be addressed include ongoing evaluation of the usefulness and effectiveness of the garden's website in facilitating visitor decision-making and constant re-evaluation of the objectives set regarding which visitor segments are to be targeted, and which products are to be marketed (Payer & Prideaux, 2015).

Bansal and Kumar (2011) point out that the contributions of communities to locally managed ecotourism have the potential to produce successful economic opportunities. These include high-level positions of management that can lead to reduced poverty and unemployment in the areas where the tourist destinations are located. Furthermore, ecotourism led to facilitate and infrastructure that are comparatively simpler and inexpensive than Western standards of tourism, creating more impact on the economy as they are sustained through local products, materials and labour (Dinç & Kocan, 2012).

Environmental factors become another key area that requires attention when developing botanical tourism. As Payer and Prideaux (2015) mention, the feel of the garden is an issue that needs further consideration. Given the importance of recreation as a motivation to visit gardens, areas that provide space for reflection should be designed to be consistent with the need for a peaceful, relaxing, and reflective experience.

3. Research Methodology

The tourists who visited the Peradeniya and Henarathgoda gardens within a selected time period constituted the population of the current study. This research sample consists of both national and international tourists. Under probabilistic sampling, a simple random sampling technique was used to select the research sample.

Yamane method was used to calculate the sample size, resulting in the selection of 20 international and 50 local tourists from the Peradeniya botanical garden. Similarly, 5 international and 25 local tourists from the Henarathgoda garden, were used as the research sample. A questionnaire has been distributed among the tourists to gather primary data for the study. Moreover, a literature review was also utilized to collect secondary data.

4. Results and Discussion

4.1 Distribution of Demographic Information in the Research Sample

Table 1: Demographic Information of the Botanical Garden Tourists

Demographic Characteristics	Factors	Percentage
Tourists' Status	International	25
	Local	75
Gender	Male	47
	Female	53
Age Group	18-24 years old	36
	25-30 years old	34
	31-40 years old	13
	41-50 years old	13
	Above 50 years old	4
Marital Status	Single	50
	Married	42
	Divorced	7
	Separated	1
Educational level	Elementary	1
	High School	46
	University Undergraduate	25
	Degree	28
Occupation	Business personnel	19
	Professional	15
	Executive	13
	Scientist and Technicians	6
	Educationists	7
	Other occupation	13
	No occupation	30
	Retired Person	26

Source: Survey Data, 2022

The demographic information mainly considered six (6) criteria, tourist status, gender, age, marital status, education level and occupation. According to table 1, there were 25% of international tourists and 75% of local tourists in the research sample. Among the research participants, 47% of the research participants were male while 53% of them were females. A majority of the

tourists who arrived at the selected botanical gardens (36%) were in the age group of 18-24 years. The total arrivals between the age groups of 31-40 and 41-50 recorded a similar percentage while the lowest tourist arrivals were identified in the age group of over 50 years. Furthermore, majority of tourists who arrived were single (50%). Moreover, most of the tourists have had a high school education while only 1% of them had an elementary education. Similarly, most of the tourists who were selected for the study did not have an occupation, 30% and 6% of the selected tourists were identified as scientists and technicians.

4.2 Attributes influencing the Tourists' Arrivals at the Botanical Gardens.

The study identified nine (9) attributes that influence tourists' arrival at the Peradeniya and Henarathgoda Botanical Gardens. These attributes include attending parties or sporting event, stress relief and relaxation, experiencing fun and enjoyment, studying planting methods, observing gardening techniques, enhancing the knowledge of plant diversity, conducting scientific research and to participating educational programs as horticulture courses. Table 2 shows notable differences between local and international tourists, as well as between the two selected gardens. In the Peradeniya Botanical Garden, the majority (90%) of local tourists visited for fun and enjoyment. However, in the Henarathgoda Botanical Garden, stress relief and relaxation emerged as the major attribute influencing tourists' arrival (53%). None of the tourists visited the Peradeniya Garden for educational programs (horticulture courses), while none visited the Henarathgoda garden for scientific research. Less proportion (10%) of tourists visit to participate in educational programs (Horticulture courses) and other purposes.

Conversely, among international tourists (75%) visited Peradeniya botanical garden for fun and enjoyment. None of them visited for a parties or sporting event, do scientific research, educational programs (Horticulture courses). 45% of international tourists visiting the Peradeniya botanical garden sought stress relief and relaxation. As for the Henarathgoda Botanical Garden, the primary reason for international tourists' visits was to observe botanic gardening techniques, accounting for 55% of their visits.

Table 2: Attributes Influencing the Tourists' Arrivals

	Local	
	Peradeniya (%)	**Henarathgoda (%)**
For a party or sporting event	7	20
To destress and relax	69	53
For fun & enjoyment	80	50
To study planting methods	13	17
To observe gardening techniques	20	13
To improve the knowledge of plant diversity	2	17
To conduct scientific research	1	0
To participate in educational programmes (Horticulture courses)	0	10
Other	0	10
	International	
	Peradeniya (%)	**Henarathgoda (%)**
For a party or sporting event	0	0
To destress & relax	45	52
For fun & enjoyment	75	50
To study planting methods	30	0
To observe gardening techniques	40	55
To improve the knowledge of plant diversity	5	20
To conduct scientific research	0	0
To participate in educational programmes (Horticulture courses)	0	0
Other	0	0

Source: Survey Data, 2022

The above table aptly summarizes the different factors that affect tourists' (local and international) visits to the selected botanical gardens.

4.3 Exploratory Factor Analysis and Reliability Testing in the Peradeniya Botanical Gardens

As illustrated in table 3, the results of the exploratory factor analysis in the Peradeniya Botanical Garden have identified five (5) main factors among eleven (11) variables that were defined by the thirteen (13) variables. These five factors, which were analysed through a combination of the thirteen variables, reveal their contribution to the tourist visits. The five factors that influenced tourist visits to the Peradeniya Botanical Garden are external

facilities, natural environment, garden environment, transportation, and communication, and safety.

These results indicate that the external facilities, natural environment, garden environment, transportation and communication and safety are the key factors that affect tourists' decision to visit the Peradeniya Botanical Garden.

Table 3: Factor Analysis in the Peradeniya Botanical Garden

Attributes	**Factor Loading**				
	1	**2**	**3**	**4**	**5**
External Facilities					
Restaurant Facilities	**0.806**	0.653	0.632	0.528	0.229
Accommodation Facilities	**0.714**	0.598	0.654	0.258	0.367
Banking / Finance Facilities	**0.826**	0.239	0.297	0.569	0.659
Natural Environment					
Peaceful Atmosphere	0.369	**0.698**	0.325	0.609	0.602
Climate	0.236	**0.719**	0.293	0.258	0.392
Garden Environment					
Natural Attraction	0.700	0.623	**0.834**	0.609	0.622
Drinking Water	0.422	0.029	**0.538**	0.289	0.399
Transportation					
Transportation	0.698	0.379	0.278	**0.808**	0.722
Communication and Security					
Telecommunication facilities	0.235	0.269	0.569	0.495	**0.664**
Safety and Security	0.524	0.725	0.752	0.652	**0.825**
Proper Guidance Services	0.752	0.663	0.625	0.752	**0.776**
Variance (%)	23.091	14.875	12.109	10.225	8.427
Cumulative Variance	23.091	37.967	50.076	60.300	68.728
Cronbach's Alpha	0.756	0.761	0.718	0.709	0.794
Kaiser-Meyer-Olkin Measure of Sampling Adequacy .819					
Bartlett's Test of Sphericity p= 0.000 (240.659, df = 78)					

Source: Survey Data, 2022

According to table 3, Bartlett's Test of Sphericity has revealed a score of 140.659, and the significance of the correlation matrix (p-value) is 0.000. These numbers were obtained by analyzing data through exploratory factor analysis. 68.73% of the cumulative variance of the data and more than 0.7 of Cronbach's Alpha values show the reliability of factors.

4.4 Exploratory Factor Analysis and Reliability Testing in Henarathgoda Botanical Gardens

Table 4: Factor Analysis in Henarathgoda Botanical Garden

Attributes	Factor Loading			
	1	**2**	**3**	**4**
Facilities				
Restaurant Facilities	**0.780**	0.699	0.362	0.458
Accommodation Facilities	**0.866**	0.270	0.793	0.622
Banking / Finance Facilities	**0.687**	0.529	0.029	0.298
Telecommunication Facilities	**0.855**	0.691	0.620	0.731
Transportation and Security				
Transportation	0.694	**0.744**	0.609	0.623
Safety and Security	0.600	**0.540**	0.528	0.369
Proper Guidance Services	0.658	**0.724**	0.621	0.509
Parking and Sanitation				
Vehicle Parking Facilities	0.692	0.722	**0.844**	0.412
Sanitation	0.522	0.497	**0.562**	0.329
Natural Attraction				
Natural Attraction	0.396	0.802	0.688	**0.900**
Variance (%)	24.693	19.233	13.517	10.485
Cumulative Variance	24.693	43.926	57.927	67.927
Cronbach's Alpha	0.717	0.751	0.742	0.749
Kaiser-Meyer-Olkin Measure of Sampling Adequacy .768				
Bartlett's Test of Sphericity p = 0.000 (400.091, df = 78)				

Source: Survey Data, 2022

According to the table 4, 4there are only four (4) main factors that have been identified through exploratory factor analysis in the Henarathgoda Botanical Gardens. These four factors can be explained through eleven (11) variables that were defined by the original thirteen (13) variables. Compared to the Peradeniya Botanical Garden the impact of these variables upon the identified 4 factors indicates a marked difference. The main four factors thus identified include facilities, transportation, internal safety, parking and sanitation as well as natural attraction. As stated in the table 4, Bartlett's Test of Sphericity has recorded a score of 400.091, while the significance of the correlation matrix (p-value) is 0.000, numbers that were obtained after conducting the exploratory factor analysis. 67.927% of the cumulative variance of the data and more than 0.7 of Cronbach's Alpha values show the reliability of factors.

These results indicate that the facilities such as transportation, security, parking and sanitation, along with the natural attraction of the garden are the key factors that barely influence tourists' decisions to visit Henarathgoda Botanical Garden.

5. Conclusion and Recommendations

5.1 Conclusion

Using exploratory factor analysis, the study has identified key factors that impact tourist arrivals in the selected botanical gardens. For instance, through an analysis of 13 attributes, it has identified five (5) factors that influence tourists' decisions to visit Peradeniya Botanical Garden which can be listed as external facilities, natural environment, garden environment, security and transportation and communication. Four (4) main factors that play a similar role in the Henarathgoda Botanical Gardens are also identified which include facilities, transportation and security, parking and sanitation and natural attraction of the garden. Therefore, it can be argued that the key objective of this study, which was to identify the factors that affect tourist arrivals in the two botanical gardens, has been successfully achieved.

5.2 Recommendations

A close examination of the suggestions made by the tourists reveals that it is important to develop sanitation facilities in both botanical gardens. Especially, garden maintenance teams should focus on improving sanitation facilities to match the different habits and requirements of international tourists. A case in point is one international tourist who visited both Peradeniya and Henarathgoda gardens. They highlighted the importance of making toilet paper available in the washrooms of the gardens when facilitating international visitors. Comparatively, there is a potent necessity to improve vehicle parking facilities in the Peradeniya Botanical Garden given that it attracts more tourists than the Henarathgoda botanical garden. This calls for making enough parking facilities available in the garden to avoid traffic congestion. Moreover, the inadequacy of the information that is available to tourists has had a drastic impact on the arrival of international tourists at the Henarathgoda Botanical Garden. On the other hand, the availability of information for the tourists at the Peradeniya Botanical Garden remains satisfactory, working to attract more visitors. Thus, it points to the need to improve information availability at the

Henarathgoda Botanical Garden. Therefore, this study concludes that sustained attention to such issues as raised in this study would help policymakers to improve the tourism industry that surrounds these botanical gardens.

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Forecasting the Weekly Incidence of Dengue in Colombo District

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Abstract

Dengue is an alarming public health concern in terms of its preventive and curative measures among people in Sri Lanka and thus forecasting incidence of dengue and its fewer counts is a vital event. This study was designed to develop an ARIMA model for the weekly incidence of dengue in the Colombo district of Sri Lanka using weekly occurrence data of dengue fever counts from January 2015 to August 2020. ARIMA (2,1,0) with the addition of AR (16) was identified as the best-fitted model. The model was trained using data from January 2015 to December 2019, while data from 2000 was used to validate the model as an independent data set. The best-fitted model was identified based on the significance of the parameters, AIC, and SBIC indicators. The residuals of the fitted model satisfied the randomness and constant variance. The results showed that the forecasted figures were consistent with the observed series. However, a noticeable percentage error was observed sequentially in the late 2020s. These errors could be attributable to the fact that there was an underreporting of dengue fever cases due to social and operational shocks of the Pandemic Covid-19.

Keywords: ARIMA, Dengue, Time series analysis

1. Introduction

Dengue is a disease of public health concern transmitted by mosquitos known as Aedes aegypti and Aedes albopictus. Being the vectors, these mosquitos have a lifecycle with aquatic stages, and disease the transmission depends on climate factors such as rainfall, humidity, temperature, and winds (Colón-González et al., 2021). Since the disease transmission requires to have contact

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between the vector and the host, the incidence of dengue is also affected by the behavior and exposure of the host. Therefore, dengue is a viral disease transmitted by mosquitos vectors, is affected by seasonal variations in climate factors, host behavior, and vector characteristics.

Since viral diseases have a range of manifestations from non to severe, those individuals with clinical symptoms are identified and reported. The ability of the virus to cause detectable symptoms in host is related to its ferocity, known as virulence.

Considering the aforementioned factors, the prevalence and incidence of dengue are influenced by multiple factors and can exhibit seasonal patterns. While many authors have attempted statistical analyses to describe the epidemiology of the disease and make forecasts, most of these attempts have been situational and localized rather than generalized, limiting their utility (Johansson et al., 2019). Nevertheless, several authors have focused on describing the disease and its forecasts based on observable parameters, often neglecting to estimate the effects of invisible factors such as viral strain virulence, host and vector behavioral patterns, and population immunity. The rarity of such estimates is due to the difficulty in accurately measuring these factors without employing mathematical modeling, as demonstrated by Hartley et al. (2002). Consequently, many authors have attempted univariate time series analyses which consists of observations of a single variable recorded sequentially over time. Box Jenkins model approach (Box et al., 2015) is one such method that many authors have attempted. The analysis of this study was also based on the method proposed by Box et al., (2015).

Various modeling techniques have been employed to forecast the occurrence of communicable diseases like dengue, including Seasonal Autoregressive Integrated Moving Average (SARIMA), Wavelet Time Series, General Additive Mixed (GAM) models, Spatial analysis, Non-linear methods, Multivariate modeling, and Global Circulation models (Naish et al., 2014). Among them, ARIMA modeling is a popular method for statistical forecasting of time series data. Dom et. al., (2013), in their study on forecasting the incidence of dengue in a selected region of Malaysia using ARIMA modeling on the weekly number of cases, concluded that ARIMA modeling is particularly valuable as a tool in decision-making for disease control and

prevention. Shah and Sani (2011) also asserted that the incidence of dengue can be accurately predicted by using time series modeling.

However, comparatively less work has been done to model and forecast the incidence of dengue in Sri Lanka. Therefore, the objective of this study is to develop a time series model for the weekly incidence of dengue in the Colombo district of Sri Lanka.

2. Materials and Methods

2.1 Secondary Data

The reported cases of weekly dengue fever from the 01st of January 2015 to the 30th of August 2020 were extracted (296 points) from Weekly Epidemiological Reports (WER) published by the Epidemiology Unit (Epid Unit) of the Ministry of Health, Sri Lanka.

ARIMA (p, q) models

An ARMA model is formed from a combination of moving average (MA) model and auto regressive model (AR) models consisting of p number of AR terms and q number of MA terms and thus ARMA (p, q) model is generally represented by,

$$Y_t = \mu + \emptyset_1 Y_{t-1} + \emptyset_2 Y_{t-2} + \cdots + \emptyset_p Y_{t-p} + e_t - \theta_1 e_1 - \theta_2 e_2 - \cdots \theta_q e_{t-q} \quad (1)$$

Where $\emptyset_i$ (i=1,2,…p) and θ_j (=1.2….q) is the coefficient AR part and MA part respectively.

Stationary series

A special case of a stochastic process is known as the stationary process. A stochastic process is considered stationary if, for arbitrary points in time $t_1,t_2,..t_n$, the joint distribution of the random variables and $\{Y_{t1+h}, Y_{t2+h}, \ldots\ldots\ldots Y_{tn+h}\}$ are the same. This means that shifting the time axis forward or backward does not affect the joint distribution function. In other words, the probabilistic structure of the stationary series remains invariant under the translation of the time axis. However, as this is very strong for the application of time series, the concept of weekly stationery has been

introduced. Thus in time series, a stationary series has the property that the mean and the variance do not change over time.

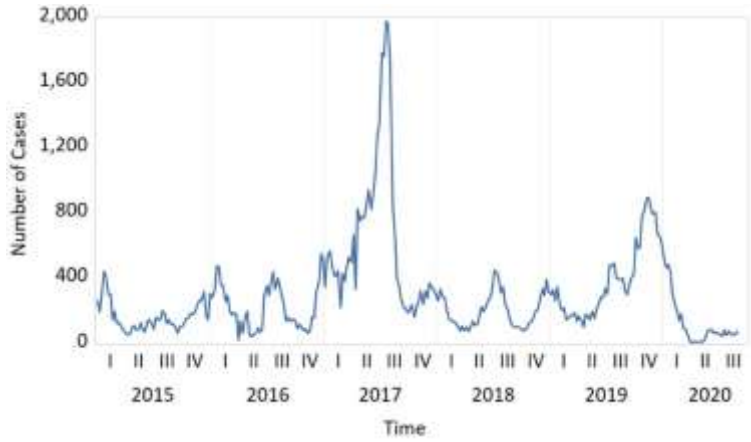
Data were developed using EViews software and the best-fitted model was selected based on standard indicators.

First original data series were tested for stationary using Dicky Fuller test and then stationary was obtained using the first differenced series. Based on the ACF and PACF of the stationary series, possible models were decided by comparing the theoretical ACF and PACF of the selected models. The model diagnostics of the final model were carried out for the recommended model.

3. Results and Discussion

Temporal Variability

Figure 1: Time series plot of the weekly incidence of dengue cases



Source: Survey Data, 2022

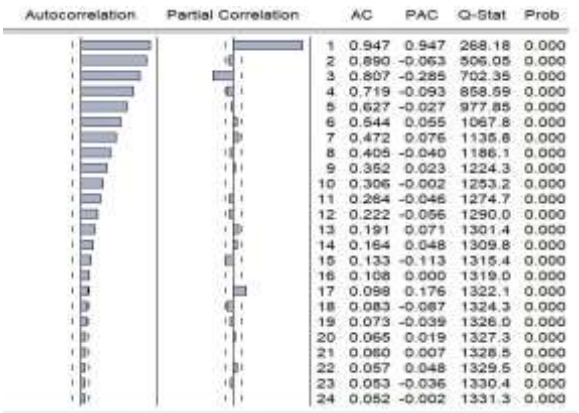
The mean number of cases per week was 295 while the median was 201. The lowest weekly incidence was 2 (1st week of April 2020) and the highest was 1972 (3rd week of July 2017). The time series plot in Figure 1 illustrates that the original observed series was nonstationary. This was confirmed by using the ACF plot (Figure 2) and the Augmented Dickey-Fuller (ADF) test.

Stationary Series

The null hypothesis of ADF test is that there is a unit root in an AR model, which suggests that the data series is nonstationary. The correlogram of the

original series (Figure 2) confirmed its non-stationarity by indicating that the ACF was significantly different from zero and exhibited a slow and gradual decline with the lags. Furthermore, the results of the ADF test for the original series were not significant.

Figure 2. Correlogram of the original series of data

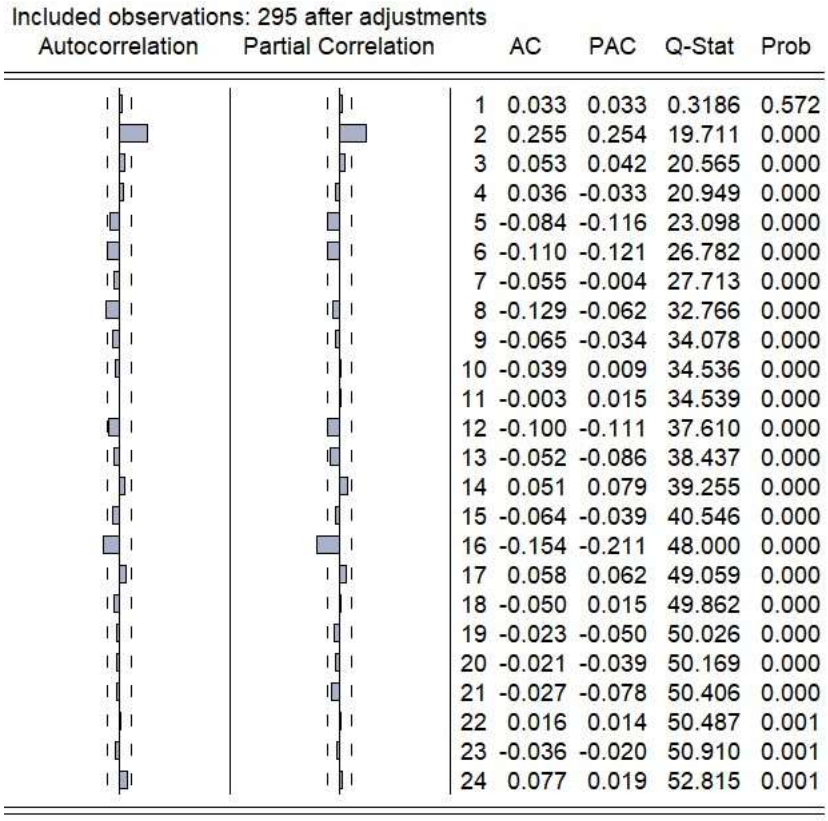


	AC	PAC	Q-Stat	Prob
1	0.947	0.947	268.18	0.000
2	0.890	-0.063	506.05	0.000
3	0.807	-0.285	702.35	0.000
4	0.719	-0.093	858.59	0.000
5	0.627	-0.027	977.85	0.000
6	0.544	0.055	1067.8	0.000
7	0.472	0.076	1135.8	0.000
8	0.405	-0.040	1186.1	0.000
9	0.352	0.023	1224.3	0.000
10	0.306	-0.002	1253.2	0.000
11	0.264	-0.046	1274.7	0.000
12	0.222	-0.056	1290.0	0.000
13	0.191	0.071	1301.4	0.000
14	0.164	0.048	1309.8	0.000
15	0.133	-0.113	1315.4	0.000
16	0.108	0.000	1319.0	0.000
17	0.098	0.176	1322.1	0.000
18	0.083	-0.067	1324.3	0.000
19	0.073	-0.039	1326.0	0.000
20	0.065	0.019	1327.3	0.000
21	0.060	0.007	1328.5	0.000
22	0.057	0.048	1329.5	0.000
23	0.053	-0.036	1330.4	0.000
24	0.052	-0.002	1331.3	0.000

Source: Survey Data, 2022

Furthermore, the pattern of ACF confirmed the absence of seasonality. To make the series stationery, the first order differencing was performed. The ADF test conducted on the first differenced series yielded significant results ($p < 0.05$) for all three test statistics, providing a 95% confidence level to conclude that the first order differencing made the series stationary. The correlogram of the first differenced series is shown in Figure 3.

Figure 3. Correlogram of the first order differenced series



Included observations: 295 after adjustments

Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob
		1	0.033	0.033	0.3186	0.572
		2	0.255	0.254	19.711	0.000
		3	0.053	0.042	20.565	0.000
		4	0.036	-0.033	20.949	0.000
		5	-0.084	-0.116	23.098	0.000
		6	-0.110	-0.121	26.782	0.000
		7	-0.055	-0.004	27.713	0.000
		8	-0.129	-0.062	32.766	0.000
		9	-0.065	-0.034	34.078	0.000
		10	-0.039	0.009	34.536	0.000
		11	-0.003	0.015	34.539	0.000
		12	-0.100	-0.111	37.610	0.000
		13	-0.052	-0.086	38.437	0.000
		14	0.051	0.079	39.255	0.000
		15	-0.064	-0.039	40.546	0.000
		16	-0.154	-0.211	48.000	0.000
		17	0.058	0.062	49.059	0.000
		18	-0.050	0.015	49.862	0.000
		19	-0.023	-0.050	50.026	0.000
		20	-0.021	-0.039	50.169	0.000
		21	-0.027	-0.078	50.406	0.000
		22	0.016	0.014	50.487	0.001
		23	-0.036	-0.020	50.910	0.001
		24	0.077	0.019	52.815	0.001

Source: Survey Data, 2022

Both ACF and PACF of the correlogram (Figure 3) demonstrated a rapid decline after lag 2, with statistical significance observed only at the same lag. This pattern suggests the ARIMA process, as both ACF and PACF exhibit exponential decay. Based on this observation, the following three models; ARIMA (2,1,0), ARIMA (0,1,2), and ARIMA (2,1,2) were considered the most appropriate tentative models to proceed with.

3.1 Identification of the best-fitted model

A comparison of those three ARIMA models based on conventional criteria for assessing the goodness is shown in the Table. 1.

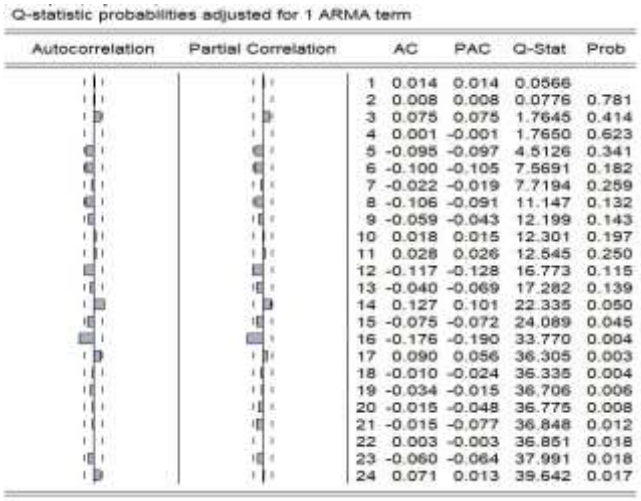
Table 1: Comparison of the selected ARIMA models

Indicators		Model	
	ARIMA (2,1,0)	**ARIMA (0,1,2)**	**ARIMA (2,1,2)**
Parameter– AR (1)	significant	not applicable	not significant
Parameter– AR (2)	significant	not applicable	not significant
Parameter– MA (1)	not applicable	significant	not significant
Parameter– MA (2)	not applicable	significant	not significant
σ^2_Volatility	8743.8	8770.2	8738.7
AIC	11.935	11.938	11.940
SBIC	11.972	11.975	11.991

Source: Survey Data, 2022

Results presented in Table 1 indicated that all parameters in ARIMA (2,1,2) were not statistically significant, suggesting that this model was not appropriate for further analysis. In both ARIMA (2,1,0) and ARIMA (0,1,2), the coefficients were significantly difference from zero. The σ^2_volatility in ARIMA (2,1,0) was significantly less than that in ARIMA (0,1,2). Furthermore, both AIC and BIC statistics in ARIMA (2,1,0) were less than the corresponding values in ARIMA (0,1,2). Therefore, ARIMA (2,1,0) was chosen as the best-fitted model of all. The ACF and PACF of the residuals of the ARIMA (2,1,0) are displayed in Figure 5.

Figure 5: Correlogram of the residuals of the ARIMA model (2,1,0)



	AC	PAC	Q-Stat	Prob
1	0.014	0.014	0.0566	
2	0.008	0.008	0.0776	0.781
3	0.075	0.075	1.7645	0.414
4	0.001	-0.001	1.7650	0.623
5	-0.095	-0.097	4.5126	0.341
6	-0.100	-0.105	7.5691	0.182
7	-0.022	-0.019	7.7194	0.259
8	-0.106	-0.091	11.147	0.132
9	-0.059	-0.043	12.199	0.143
10	0.018	0.015	12.301	0.197
11	0.028	0.026	12.545	0.250
12	-0.117	-0.128	16.773	0.115
13	-0.040	-0.069	17.282	0.139
14	0.127	0.101	22.335	0.050
15	-0.075	-0.072	24.089	0.045
16	-0.176	-0.190	33.770	0.004
17	0.090	0.056	36.305	0.003
18	-0.010	-0.024	36.335	0.004
19	-0.034	-0.015	36.706	0.006
20	-0.015	-0.048	36.775	0.008
21	-0.015	-0.077	36.848	0.012
22	0.003	-0.003	36.851	0.018
23	-0.060	-0.064	37.991	0.018
24	0.071	0.013	39.642	0.017

Source: Survey Data, 2022

In Figure 5, it can be observed that the Q-statistic probabilities associated with the ACF were not statistically significant up to lag 14. However, the correlogram shown in Figure 5 indicates significant correlations in both the ACF and PACF after lag 16. Therefore, a re-estimation was performed by adding AR (16) and MA (16) separately to ARIMA (2,1,0). By Comparing those indicators; AIC, BIC, and σ^2_volatility, it was confirmed that adding AR (16) terms was more appropriate than adding the terms of MA (16). Thus, ARIMA (2,1,0) + AR (16) was considered as the best-fitted model to represent the weekly incidence of dengue in the tested series. Notably, AR (1) was found to be non – significant, leading to a model refit with only AR (2) and AR (16). The results presented in Table 2 demonstrate that all parameters in the model are significant ($p < 0.05$). Furthermore, the plot of ACF for the residuals of the best-fitted model verifies the presence of randomness in the errors.

Table 2: Details of the parameters of ARIMA (2,1,2) + AR

Included observations: 295
Convergence achieved after 87 iterations
Coefficient covariance computed using outer product of gradients

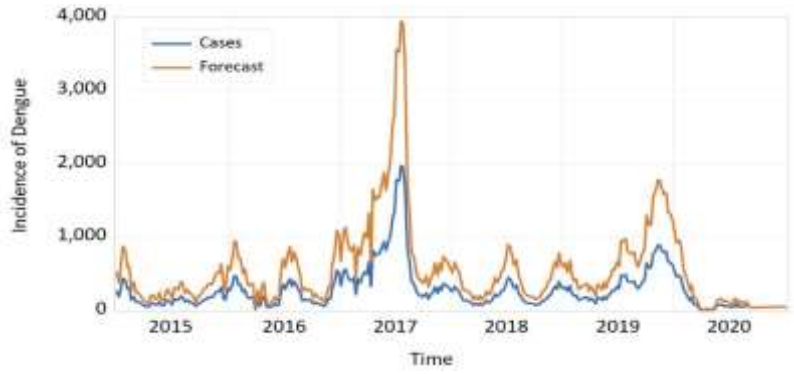
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.529103	7.472788	-0.070804	0.9436
AR(2)	0.262049	0.054137	4.840446	0.0000
AR(16)	-0.163280	0.027749	-5.884273	0.0000
SIGMASQ	8475.277	308.0737	27.51055	0.0000

R-squared	0.093936	Mean dependent var	-0.637288
Adjusted R-squared	0.084596	S.D. dependent var	96.88018
S.E. of regression	92.69183	Akaike info criterion	11.91198
Sum squared resid	2500207.	Schwarz criterion	11.96197
Log likelihood	-1753.017	Hannan-Quinn criter.	11.93200
F-statistic	10.05650	Durbin-Watson stat	1.960523
Prob(F-statistic)	0.000003		

Source: Survey Data, 2022

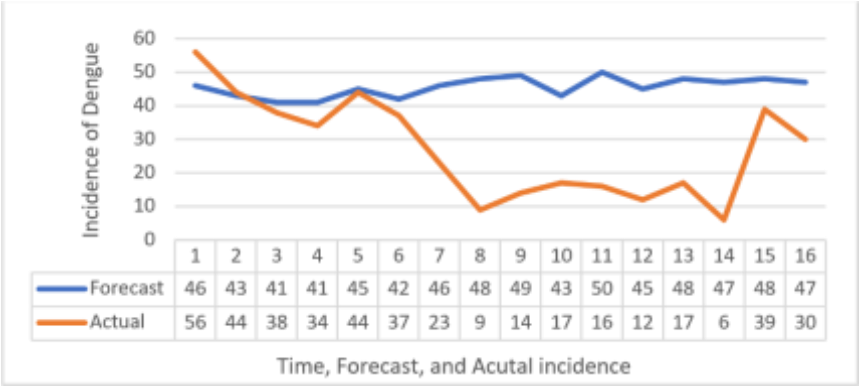
Observed vs predicted values for both training and validation sets

Figure 6: Forecasted and actual values of the incidence of dengue for the training data set



Source: Survey Data, 2022

Figure 7: Forecasted and actual values of the incidence of dengue for the validation set (September-December 2020)



	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Forecast	46	43	41	41	45	42	46	48	49	43	50	45	48	47	48	47
Actual	56	44	38	34	44	37	23	9	14	17	16	12	17	6	39	30

Source: Survey Data, 2022

Although it seemed the estimations were overexpressed at some points for the training set (see figure 6), the pattern of the estimate was good enough for forecasting the incidence of dengue. However, almost all points were underestimated. As we felt that mean absolute percentage error (MAPE) is not a good indicator to check the forecasting power of each point, the percentage errors were computed for all points. The percentage error for the training set varied from -10% to -25%. However, for the validation set, as shown in figure 7 the forecasted and the actual incidence of dengue was much closer in the first six weeks, and then in the last two. However, there was a considerable gap in weeks in-between and the percentage error was over

100%. It was clear that the forecasted figures were much closer to the actual figures except for the weeks from 7 to 14. The period stipulated for the above forecast was from early September 2020 to the middle of December 2020. Therefore, it was likely that there had been an under-reporting of the dengue cases during that period. In fact, it was the period that Sri Lanka was hardly hit by the effects of the Pandemic Covid-19. Restricted social mobility, halted human activities, particularly in the risky environments for dengue transmission, and the possibility of less prioritized attention by public health officials over the Pandemic management, were among the potential reasons behind the shrunken incidence of dengue notified to the Epidemiology Unit.

4. Conclusion

In our study, ARIMA (2,1,0) with an additional term of AR (16) was found to be a good statistical model for dengue prediction and forecasting. The fitted model was tested for an independent data set and its goodness was proven. Furthermore, the errors of the model were found to be white noise. Thus, ARIMA (2,1,0) with an additional term of AR (16) is recommended to forecast the incidence of dengue in the Colombo district and so to predict the potential outbreaks of dengue in the district to have optimized responses in outbreak management. Though the inclusion of AR (16) was found to be superior than other models, it used to under estimate for the training set for all points and over estimate for the validation set. These are the typical problems in ARIMA modelling and it is suggested to develop further to minimize such errors.

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Right View on Sustainability

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Abstract

This paper explores the fundamental concept of sustainability and its relationship to right vision. Recognizing that a comprehensive understanding of sustainability necessitates a precise understanding of right vision, the researchers direct their focus to unraveling the essence of this concept. Drawing upon insights from Buddhist philosophy, the study highlights the interconnectedness between sustainability, simplicity, and detachment from excessive desires. It proposes that sustainability can be defined as the natural manifestation of Ariya qualities, guided by right vision. The study examines the cause-and-effect chain leading to overconsumption and scarcity of resources, emphasizing the need to address the attachment to extra wants. Insights from various scholars and research studies support the significance of simplicity and non-violence in achieving sustainability. The implications of this research extend to academia, policymakers, and society, emphasizing the importance of promoting sustainable lifestyles and integrating sustainable development goals into policy frameworks. By embracing simplicity and right vision, individuals can contribute to a more balanced and harmonious relationship with the environment. This paper provides a valuable perspective on redefining sustainability and offers insights for future research and practical applications in the pursuit of a sustainable future.

Keywords: Cause and Effect, Park, Recreation, Right View, Sustainability

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1. Introduction

The concept of sustainability has been widely discussed and researched in various fields. This paper represents another step in a long journey to find the root definition of sustainability. The researchers themselves embarked on this journey, initially attempting to derive the definition of the definition itself. Their exploration led them to the understanding that the definition should be derived from the term considered through the wisdom of Nirukti (K Jayantha, et al., 2022). Building upon this foundation, they further sought to uncover the root definition of sustainability using the same verse and the knowledge of Nirukti. Through their diligent efforts, they arrived at the realization that the root definition of sustainability is "letting to open Ariya qualities naturally" (K Jayantha et al., 2020).

However, a question emerged regarding the nature of Ariya qualities. In response, the researchers turned their attention to understanding what Ariya qualities truly entail. This subsequent endeavor proved fruitful, as they discovered that Ariya qualities refer to right vision (K Jayantha, et al., 2021). Recognizing that a comprehensive understanding of sustainability necessitates a precise comprehension of right vision, they directed their focus to unraveling the essence of this concept, which is the primary objective of this paper.

By delving deeper into the notion of sustainability and its foundational elements, this study aims to contribute to the ongoing discourse on sustainability. The researchers firmly believe that by uncovering the true essence of sustainability and understanding the significance of right vision, they can offer valuable insights into the concept and its practical application.

1.1 The study objectives and research questions are as follows:

1. to understand the right view leading to identify the closest cause of a problem.
2. to understand the right view leading to identify the root cause of a problem.
3. to understand the right view to demolish the root cause.
4. to identify the right view on steps that need to be taken to demolish the root cause.
5. to develop a definition for the concept of sustainability based on the right view.

1.2 Initially, answers were explored to the questions in brief:

1. What is meant by sustainability?
2. What is being addressed by sustainability?
3. And what are the existing criticisms of sustainability?

2. Definition of sustainability

The concept on sustainability and sustainable development of the environment became a major concern through the Brundtland Report in 1987. Sustainability means that the needs of the present will be fulfilled without adversely affecting future generations (Jarvie, 2011; Kono, 2014; Thomsen, 2013a; Visser & Brundtland, 2013). Many literary sources have followed the same definition or the same context of the Brundtland report to elaborate on sustainability (Mensah, 2019). Ultimately, the idea of sustainability must be the balance between the requirements of stewardship and a better quality of life (Kuhlman & Farrington, 2010).Therefore, it says reconciling these two is sustainable (Kuhlman & Farrington, 2010). Additionally, sustainability is defined as the ability to do little or no damage to the environment, and endure over a long time (Cambridge Dictionary, 2021). This descriptio by the Cambridge Dictionary is consistent with other definitions. However, the Cambridge Dictionary defines the concept based on environmental science and it indicates an ecological balance in the long run. It is difficult to find considerably different meanings in relation to sustainability than wording they use(Kaiser et al., 2021; Towers, n.d.). Most probably, the majority mentions, almost the same idea, being specific to the field they belong to.

2.1 Historical view of sustainability

The history of the concept of sustainability seems to be lacking one opinion. The word "sustainably" or "*Nachhaltigkeit*" first appeared in 1713 (Wilderer, 2007). Researchers point out that the concept of sustainability originated in forests (Wiersum, 2004; Wiersum, 1995). According to Wiersum (1995), sustainability means not harvesting beyond the limits of forest growth. Some scholars even describe this concept as older. The effort of those scholars was to connect this concept with Paleolithic era and the scholars say protecting natural resources for the future should be everlasting (Muñoz et al., 2019). Paleolithic ancestors adapted their lifestyle to protect natural resources (Henke et al., 2007). Similarly, early farmers also took measures to protect the soils'

fertility. Traditional beliefs were carefully passed down to future generations to protect the soil and natural resources. A Nigerian tribal chief once said that 'many people have died, few are alive, and countless others unborn' (Ike, 1984; Oshio, 1990) . When considering historical perspectives, it is still hard to see any differences within their ideology on sustainability. It appears that they believed sustainability as something the man should do. Actually, can that be true?

2.2 Criticisms on Sustainability

Some accepted and some did not accept the definitions presented on sustainability. There are criticisms of this concept. Many critics say, a better lifestyle and protecting natural resources cannot be satisfied simultaneously. For instance, World Commission on Environment, (1987) pointed out that the problem for Brundtland and colleagues was how to reconcile people's pursuit for better lifestyles with the limitations of natural resource s and environmental degradation simultaneously. According to the Brundtland Report, the Brundtland commission aimed to integrate two different concepts at once: development and environment. In other words, the commission was trying to match short-term and long-term needs and limited resources. However, the concept of sustainability today, is mostly focused on three dimensions such as social, economic and environmental (Purvis et al., 2019; Thomsen, 2013b) Particularly, according to the United Nations Agenda for Development. The management of these dimensions is known as sustainable development (Purvis et al., 2019; Thomsen, 2013b). However, scholars have pointed out that the concept of sustainability is poorly defined (Kuhlman & Farrington, 2010). Sustainability means that both natural and man-made resources are maintained at a minimum capacity for future generations (Mensah, 2019). Scholars point out that this definition of sustainability is unclear (Kuhlman & Farrington, 2010). They highlight the need for further clarification of this concept. They state that the definition of sustainability needs to be reconsidered. They suggest that the concepts of well-being and sustainability should be considered together. Critics further explain the contradictions in definitions of sustainability. (Kopnina et al., 2018; Purvis et al., 2019). However, it is not clear whether such criticisms are still within or outside the main ideology because their explanations line to human activity or human well-being. They maintain the main idea of using natural resources in a safe way to meet existing needs. The concept of sustainability that focuses

the current and future needs, along with the limited resources, creates a conflict: how practicable is the effort to preserve the current consumer needs and protect the future needs simultaneously? Can people become easily satisfied and not self-centered?

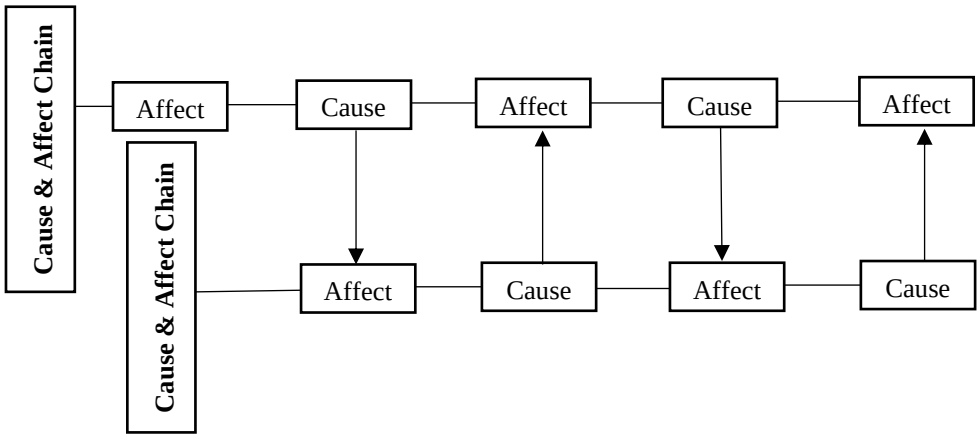
Therefore, various scholars and institutions have suggested various ways of addressing these issues. For example, some have suggested eco-friendly constructions. Many scholars have suggested the use of bamboo to promote sustainable construction (Manandhar et al., 2019; Nurdiah, 2016; Zea Escamilla & Habert, 2014). They emphasized the economic benefits that the community would experience because of bamboo-based constructions. This means that sustainable development can be achieved through eco-friendly products while maintaining economic expectations of the people. The aim was to make the production process environmentally friendly while sustaining the existing consumption pattern. Some scholars have pointed out that sustainable construction should be introduced to tackle the air pollution caused by urbanization (Gan et al., 2015). However, the researchers propose that neither the constructions nor the urbanization are the problem, instead what has been missing due to urbanization or constructions, should be investigated. Some scholars seek to promote sustainable development by managing the resource overuse (Eisenmenger et al., 2020; Gupta & Vegelin, 2016). Creating a vision for sustainable development and planning the present and future consumption can be managed sustainably while meeting the needs of the growing global population (Hauschild, 2005, 2015). It is further proposed that the current requirements can be met within sustainable limits. The key here is to identify the current quota and consumption. The question that arises is whether the present share is sufficient to fill the present needs. These are just a few examples to demonstrate where the solutions are aimed to confirm the sustainability. However, it is necessary to reconsider whether these solutions are presented with the right vision.

2.3 Right View

The exploration on right view is basically a review of the cause-and-effect principle and the need of identifying this principle accurately is strongly proposed. A cause gives rise to a result or effect. Examining the result or effect as a coincidence does not help in identifying the actual underlying issue. It is essential to remember that finding an actual cause depends on to what extent

a problem is investigated based on the cause-and-effect chain (Bhattacharya, 1982; Cooper, 2014). One of the most appropriate methods for this is explained in the *Patichisamuppada* theory in Buddhist philosophy. According to the *sakaya nirukti* method of finding a definition *Patichisamuppada* is the corresponding generation of which willingly tied-up with something. (The sakaya nirukti method, which is used to find a definition, states that Patichisamuppada is the corresponding generation willingly linked to something). Thus, a picture could be drawn of cause-and-effect chain of something which willingly tied-up with another thing as shown in Figure 1.

Figure 1: Cause-and-Effect Chain



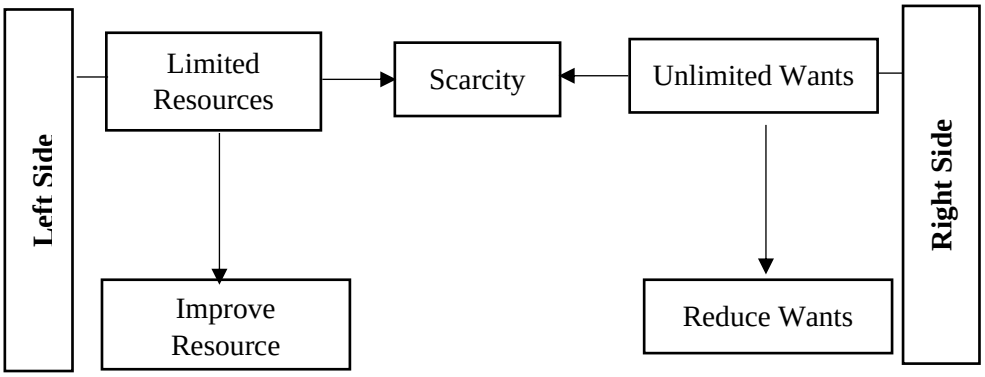
Source: Bhattacharya, 1982

The method of identifying the cause of the problem is lengthy. This process can be considered as an application of Right View that can be administrated to understand the order of the cause-and-effect relationships. To identify a correct answer, it is necessary to know the exact reason, which requires following the cause-and-effect chain. There is another side to this cause-and-effect. For instance, the cause of death can be anything such as an accident, sickness or committing suicide. There is a mechanism to treat these causes as well. Each of these immediate causes represents only surface observations. If there are people who would limit themselves to such kind of vision would be hindered by the ability to recognize the right view. In the aforementioned example, the cause of death was not correctly identified. The right reason must be birth (Ratanakul, 2004). In this way the cause must be understood correctly. That is called the Right View.

Now let us consider how the problems in world are identified and whether the provided sustainable solution is correct. Previously, it was discussed that a lack of resources has been identified as a major problem. Also, it was emphasized that the world tries to solve this problem of scarcity. The conflict that is being pointed out here is that the real issue is not the lack of resources. According to the theory of causation on the right view, there are two specific mistakes that can occur: not knowing the exact cause and not using the theory of cause-and-effect chain. Just as one identifies birth (based on the cause-and-effect chain) as the cause of the problem for death, it should be deeply discussed the factors affecting the scarcity of resource. Then only one will be able to evaluate whether the concept of sustainability is the right solution.

Economists commonly describe scarcity as a fundamental economic problem. For instance, argues that scarcity arises due to insufficient existing resources. Some others supportively say resource amenities have become scarcer (Krautkraemer, 2005). However, scarcity is not completely an economic problem. It occurs because of two immediate causes: 1. finite of resources and 2. the infinite wants (Chappelow, 2019; Krautkraemer, 2005). These two immediate causes are introduced as two-sides of a coin. In that sense, one side, wants represents socio-cultural factors. The economists consider only the other side of the coin: namely resources Economists research ways to use resources efficiently and effectively. Nevertheless, it is important for them to recognize that difficulty to change the existence of limited resources beyond a certain point and manage people's unlimited wants. Thus, it is evident that there are two immediate causes contributing to the problem of scarcity. Consequently, the next question arises: which immediate cause should be addressed? Scarcity arises from extra demand. People that extend beyond their basic needs. This consumer behavior leads to a high demand for resources. Wealthy nations fulfill their wants adequately while poorer nations-struggle to meet with their basic needs. In the pursuit of an over consuming lifestyle, resources are wasted at various stages, including production, transportation, and retention. For example, now it is vibrant that scarcity is caused by consumer behavior. Thus, it can be concluded that over-consuming lifestyle as the cause of scarcity. By carefully examining the problem based on the cause-and-effect theory, as initial level of causation can be understood as an over-consuming lifestyle that leads to scarcity. Figure 2 illustrates the factors influencing scarcity and highlights the main cause that requires attention.

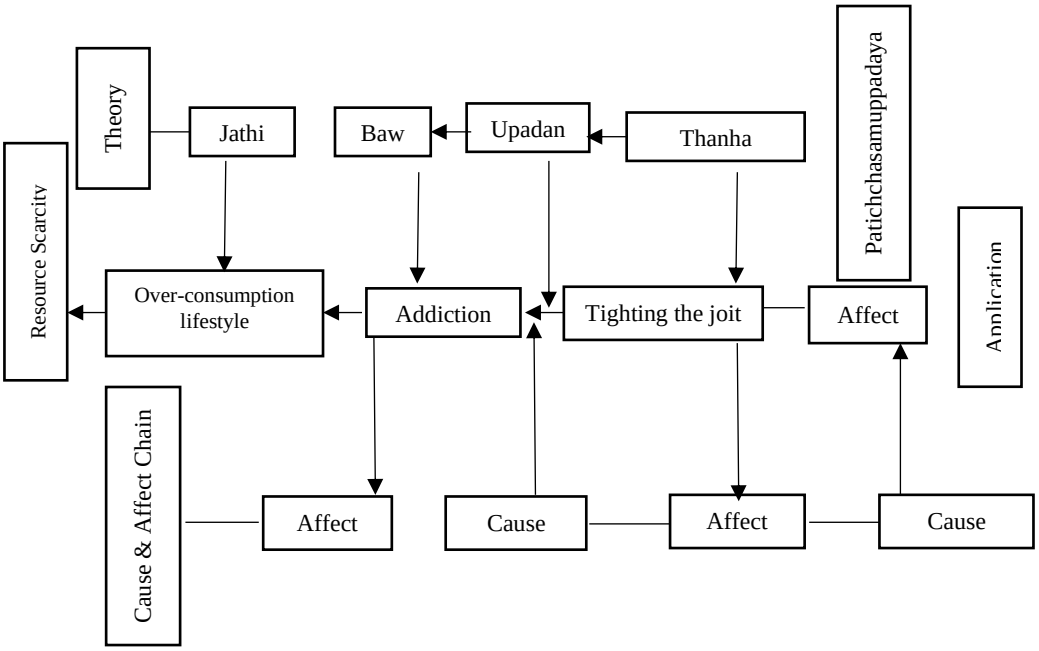
Figure 2: Factors influencing scarcity and main cause of scarcity



Source: Developed based on the literature and argument raised based on cause and affect theory

The real cause of scarcity has now been identified Consequently; scarcity is the main problem while over-consumption lifestyle being the cause. In other words, the over-consumption lifestyle has led to the current problem of scarcity. If that is indeed the case, reducing over-consuming lifestyle should be considered as the solution to scarcity. Then, again the over-consumption lifestyle must be considered as the effect. At this stage, the over-consumption lifestyle is not the cause but the effect to delve deeper into understanding the reasons behind the over-consumption lifestyle, the principle of *patichcha samuppada* (willingly tied-up with something, here is a corresponding generate) can be applied. The theory says that the development of cause and effect occurs as a chain: "*thanha pathya upadaka* (the joining place to place, cause the tightening the association towards the same), *upadana pathya bawo* (tightening the association towards the same cause the accustomed to the tightened association) and *bawa pathya jathi* (accustomed to the tightened association cause the something generates according to accustomed)". Theory here is *Thanha* (attachment/ joining place to place), *Upadana* (tightening the association towards the same), *Bawa* (accustomed to the tightened association) and *Jathi* (something generates according to accustomed) are the sources of a problem (as shown in figure 3).

Figure 3: Way of happening the first joining and developing up to addiction



Source: Developed based on the literature and argument raised based on cause and affect

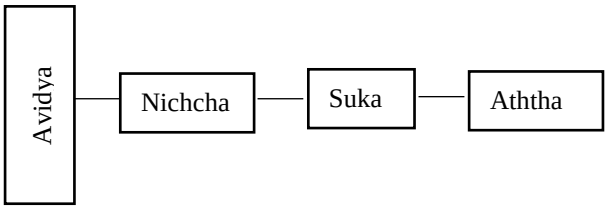
It is important to understand that the stages leading to development of over-consuming lifestyles are based on the theory. To gain further insight into this theory, studies related to drug addiction can be referred. Those studies explain stages leading to change of a person from a normal situation to an addicted position within a shorter period of time (Prochaska & Velicer, 1997). An addiction starts without a detailed plan (Helpguideorg International, 2021). Sometime stimulations of best friends (Bittar, 2018) and drug-abusing peers (Dusenbury, 1999; Gottfredson & Wilson, 2003; National Research Council, 1993) might be the triggering point of an addiction. Some scientists propose that the starting point of an addiction may be related to a biological reason such as alcoholic addicted family history (National Institute on Drug Abuse, 2011). Additionally, parental backing also may be a factor (Wills et al., 1996). Accordingly, addiction marks the beginning of a long chain that develops gradually. It can originate from simple reasons such as being exposed to peers those who are already addicted to drugs, or growing up in an environment where the drug use is common within a family, and the drug addiction would

remain over a longer period of time. This addiction would gradually motivate the people to escape from family and social responsibilities. Also, they would retard from social or recreational activities, and behave anti-socially (stealing and drug transportation) to buy drugs (Litin, 2018). These anti-social activities then become normalized behavior for them. This example illustrates how a behavioral pattern of a person can change. A behavioral change can start with a simple act influenced by their surroundings, without a deliberate and intentionally created plan. However, that simple act can evolve into a strong addiction over time and the extent of its impact varies from person to person and individual lifestyle choices. Likewise, this condition applies to the over-consumption lifestyle of a person. It is evident that the consumption of resources begins with a simple action. When that simple action continues, and the person is influenced by his/her surroundings simple actions would become complex as the wants of the people continuously grow.

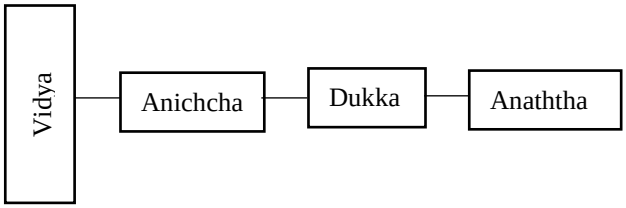
3. How to overcome the attachments towards over-consuming lifestyle (Escaping from thanha)

It is convinced that the *thanha* or the excessive attachment towards something serves as the starting point of a problem. This is the root point, where a person should address in providing a solution to a problem. In other words, detaching from something is the solution to a problem. In Sinhala culture there is a saying: “remove anything from the root otherwise, it will be difficult to remove later”. Do not wait until something grows if you want to cut that thing. Cut that thing when it is possible for you to cut using your nails. Do not let that to grow and make yourself find an axe to cut it. Therefore, having the knowledge and awareness to identify a problem at an early stage make it easier to overcome. This can be understood via two Buddhist philosophical theories: 1. the attachment towards new wants would create problems (*Avidya)* and, 2. the understanding that detaching oneself from continuous pursuit of growing desires can lead to problem resolution (*Vidya*).

Figure 4: Theory of Overcoming "Joining or the Attachment"



Theory 1 (*Avidya:* Thrilakshanaya)



Theory 2 (*Vidya:* Thrilakshanaya)

Source: Developed based on the literature and arguments raised based on cause-and-affect

According to the figure 4, theory 1 explains the reasons for a person joining with desires beyond his/ her basic needs. According to this theory, they basically think that they can fulfill all their desires definitely as it is (*Nichcha*). Therefore, they can live happily (*Suka*). This world is effective, and the happiness is definite in that sense (*Aththa*). Theory two explains the opposite ideology of theory one. According to Theory Two, one cannot maintain anything in the world as they wish. (*Anichcha*). If one wishes for all things to be aligned in order to fulfill their desires and then becomes attached to those desires, they will inevitably experience disappointment when those things are unable to fulfill their desired needs. (*Dukka*). Within such a background, if one tries to associate with the changing nature of things, one will understand that the change is a continuous happening and it is nature (*Anaththa*). Theory one explains the typical ideology of the person. However, the reality is the opposite of that ideology. Unless they are aware of the reality of the world, people would always try to fulfill their desires. They will not be convinced that such desires would never be able to fulfill. Therefore, if one can introduce the reality of the world (theory two), people will not try to make an attachment with such desires. In order to change the behavior of attachment towards extra wants one should come up with solutions to convince the *Vidya* theory because

people are in different mindsets and ideologies, and different strategies should be created in order to keep people away from the attachment to extra wants. Whatever the strategy is, the ultimate goal should be assist people in detaching themselves from extra wants.

Figure 5: Theory of Overcoming "Joining"

Source: Developed based on the discussion, 2022

One can obtain guidelines from medical research to develop detachment programs. For instance, enhance protective factors and reverse or reduce risk factors (Hawkins et al., 2014, 2002), changing attitudes and behaviors and compelling parental support (Wills et al., 1996), changing peers' behavior (Ashery et al., 1998; National Research Council, 1993), help changing aggressive behavior and poor self-control (Ialongo et al., 2001) implementing different programs for different age groups, gender groups, ethnic groups, cultural groups, and environments (Marsiglia et al., 2009; Moon et al., 1999). In addition to those attempts, the noble eightfold path, and theory of middle path (Bajželj, 2017; Compson & Monteiro, 2016) can be used. Those theories support detachment from unnecessary attachments on the materialistic things (Bajželj, 2017; Becker, 1998; Brown & Ryan, 2003; Compson & Monteiro,

2016; Conze, 1959; Wong, 2006). By understanding the reality and inability to maintain the desires as one wish, people would willingly change to a simple lifestyle which leads to decline the existing over-consumption lifestyle. All of these theories and their applications, which we have discussed so far, can be explained pictorially

3.1 Relationship with Other Research

There are many supportive ideologies for the ideas proposed in this study among academia worldwide. For example, Rafikov & Akhmetova (2019) recently pointed out the necessity of simplicity, spirituality, and universal values to remedy overconsumption. They were supported by Kenyalang (1999), who quoted Mahatma Gandhi's declaration: "the world has enough for everyone's needs, but not for everyone's greed." This idea is further defined by Bakshi (2012), who argues that it leads to the voluntary reduction of wants. Schumacher (1973) presented a very similar idea in his book "Small is Beautiful," emphasizing the importance of sustainable development and the limitations of excessive economic growth. Furthermore, several decades ago, scholars emphasized the importance of simplicity and non-violence (De Jong, 1980; Hession, 1986; Leonard, 2019; Weber, 1999). Research has also demonstrated that a simple lifestyle can lead to a higher level of life satisfaction (Boujbel & d'Astous, 2012; Leonard, 2019). Moreover, the consequences of overconsumption have driven many individuals to voluntarily change their lifestyles towards simplicity (Erdoğmuş & Karapınar, 2015). Consequently, transitioning from an over-consumption lifestyle to a simpler one can propel the world towards sustainability (Elgin, 2013).

4. Conclusion

It has been realized that the scarcity of resources is the primary problem at present. It was understood that over-consumption of resources is the cause of this problem. Furthermore, the study has revealed that the initial attachment to extra wants serves as the starting point for the development of an over-consuming lifestyle. Finally, it was theoretically proved that demolishing the initial attachment towards the extra wants would discourage the over-consuming lifestyle. Finally, the concept of sustainability was defended by suggesting that the sustainability is letting the right-view of people naturally open. This right view will be naturally emerging when the *vidya* of people is awaken. Then they will lose excessive attachments towards the wants. As

paths to the detachment, one would suggest few theories: the theory of *Thrilakshana* (joining for and detaching from something), *Noble Eightfold Path* (The Eight Ways of Leaving Something) and *Majjhima Patipada* (method of releasing from sticking and collision) and some other ways that can be found through research studies, which will be suited to different cultures and societies. As novel facts the nature of cause-and-effect chain and the significance of the need of understanding the root cause of any problem have been introduced.

5. Limitations and Future Directions

Despite the valuable insights provided in this study, it is important to acknowledge its limitations. First, the research focused primarily on theoretical perspectives and philosophical concepts, which may require further empirical validation and practical application. Future studies could explore the practical implementation of the proposed concepts and assess their effectiveness in real-world contexts.

Second, the scope of this study was limited to the exploration of the root definition of sustainability and its relationship to simplicity and right vision. While these concepts provide a solid foundation for understanding sustainability, there may be additional dimensions and factors that contribute to its comprehensive definition. Further research could delve into these aspects to provide a more holistic understanding of sustainability.

Additionally, the study primarily draws upon philosophical and academic literature, which may limit its accessibility to a broader audience. Future research could bridge the gap between theory and practice by investigating case studies, conducting surveys, or engaging with stakeholders to gain practical insights and perspectives.

6. Implications and Recommendations

The findings of this study have several implications for academia, policymakers, and society as a whole. Firstly, the recognition of simplicity as a fundamental aspect of sustainability can guide researchers and scholars in their investigations and discourse on sustainable development. It underscores the importance of promoting lifestyles that prioritize essential needs over excessive consumption, fostering environmental consciousness, and nurturing a sense of interconnectedness with the natural world.

For policymakers, understanding the root causes of overconsumption and the potential solutions offered by simplicity and right vision can inform the development of effective strategies and policies. This includes promoting sustainable consumption patterns, incentivizing eco-friendly practices, and integrating sustainable development goals into policy frameworks.

At the societal level, embracing simplicity and right vision can foster a shift in values and attitudes towards a more sustainable future. It encourages individuals to reassess their personal choices, adopt mindful consumption habits, and actively participate in creating a more balanced and harmonious relationship with the environment.

In summary, this study highlights the importance of simplicity and right vision in defining sustainability. While acknowledging the limitations of the current research, future studies should explore the practical applications, investigate additional dimensions of sustainability, and bridge the gap between theory and practice. The implications of this research emphasize the role of academia, policymakers, and society in promoting sustainable lifestyles and advancing the global agenda for a more sustainable future.

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Factors Influence on Job Satisfaction of Graduate Employees in Sri Lanka's Manufacturing Industry

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Abstract

It is important to have a satisfied workforce in an organization to build up a successful organization. Hence, the study aims to identify the factors that affect job satisfaction among graduate employees in Sri Lanka's manufacturing industry. The sample population of the study was all the graduate employees of the main five sub-sectors in Sri Lanka's manufacturing Industry. The sample (n=156) was selected from the sample population by using the stratified sampling method. Primary data was collected through a questionnaire. Initially, the study applied factor analysis and chi- squared test to derive the objective of the study. The factor analysis revealed five factors that influence job satisfaction among graduate employees. They are1- Company Policies and Supervision, 2- Working Conditions, 3- Work Itself, 4- Recognition and Advancement, 5-Job Security, and Human Relationships. Additionally, the chi- square test is used to identify the demographic factors that affect the employees' job satisfaction. The results showed that the degree obtained by the employees had a significant impact on their job satisfaction.

Keywords: Graduate Employees, Job Satisfaction, Manufacturing Industry

1. Introduction

The concept of job satisfaction has become a broad and dominant approach since human relationships are more favored. It includes a complex number of variables, conditions, feelings, and behavioral tendencies (Singh & Jain, 2013).

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Job satisfaction is defined as employees' attitudes and feelings about their work or favorable attitudes toward the job. Job dissatisfaction means unfavorable attitudes toward the job (Ayaga & Stephen, 2014). Personality, person-environment fit, job characteristics, psychological contract, organizational justice, work relationship, and stress are some elements that influence attitude towards work (Aries & Rizqi, 2013). Aziri (2011) identifies three important features of job satisfaction which include fair treatment and concern for workers by the organization, the functioning and activities of the organization, and indicators of organizational activities. As claimed by Singh and Jain (2013) job satisfaction is a part of life satisfaction. Moreover, they reveal that a person's level of satisfaction is influenced by factors such as pay and benefits, perceived fairness of the promotion system within a company, quality of working conditions, leadership, social relationships, and the nature of the job itself.

Moreover, Employees who have satisfaction with their workplaces show positive attitudes in their homes (Chimanikire et al., 2007). Moreover, it contributes to the establishment of a psychologically healthy society. Therefore, the current study based on identifying the factors that contribute to the job satisfaction of graduate employees in the manufacturing industry of Sri Lanka.

Graduates bring knowledge and ideas to an organization, and they are inclined to learn and possess flexibility, adaptability, and the ability to deal with change. Additionally, they have logical, analytical, critical thinking, problem-solving, and synthetic skills, which have a significant impact have on innovation (Harvey & Mason, 1996). Moreover, Ranasinghe and Herath (2015) have explained that employers expect graduates to be well prepared for work, to possess effective communication, to share their skills, and to appreciate their place in a wider organization. Furthermore, it is crucial to identify the factors that influence the job satisfaction of graduate employees in order to enhance the job performance of such skilled and beneficial employees.

As per the annual report of the University Grants Commission of Sri Lanka-UGCSL (2016), the total graduate output in 2015 is 29,545. State universities were considered only to calculate that amount. According to Nedelkoska et al., (2018) Science and Engineering Professionals, Managers, Production

Managers, Business and Administration Professionals, Teaching Professionals, Business and Administration Professionals, ICT Professionals, Science and Engineering Technicians, Numerical and Material Recording Clerks, Chief Executives, General, Keyboard Clerks, ICT Technicians, Legal, Social and Cultural Professionals, Customer Services Clerks, Health Professionals, Personal Service Workers, and Sales Workers were identified as the most common professions for graduates in Sri Lanka by Nedelkoska, O'Brien, and Stock (2018).

Employees of the industry sector are divided into operatives and other employee groups (DCSSL, 2018). All paid employees who directly engage in the production or related activities of the company are identified as the Operatives. And all paid employees except those covered as operatives such as Managers, Directors, Laboratory and Research workers, Clerks, and Typists are the professions that are included in the "other employee" category. Others work as proprietors and active partners of a company (DCSSL, 2018). According to DCSSL (2018) and Nedelkoska et al., (2018), more than 246,357 graduate workers are employed in Sri Lanka's manufacturing industry. It represented 2.94% of the total workforce in Sri Lanka.

Therefore, the study is mainly designed to identify the factors that affect graduate employees' job satisfaction and to identify the effect of age, gender, experience and the degree of employees on their job satisfaction in the manufacturing industry of Sri Lanka.

2. Literature Review

Many studies on job satisfaction were done focusing on different communities such as agriculture, commerce, health, and education. Chatzoglou, Vraimaki, Komsiou, Polychrou, and Diamantidis (2011) have indicated that the job satisfaction of accountants is most affected by job characteristics. But, internal work motivation does not influence job satisfaction of accountants. As per the final results of this study, both organizational commitment and professional commitment affect the job satisfaction of accountants. Moreover, they suggested mainly focusing on employee commitment levels of both organization and their profession regarding job satisfaction.

According to Parvin and Kabir (2011), the job satisfaction of pharmaceutical employees is encouraged by salary, efficiency in work, fringe supervision, and

co-workers' relationships. Rad and Moraes (2009) identified similar results that supervision and co-workers influence job satisfaction in the healthcare sector. Moreover, different factor like job identity also creates job satisfaction.

The study conducted by Marzuki et al., (2012) identified different factors that influence job satisfaction from different work categories such as permanent workers, temporary workers, main office staff, and project staff of a construction company in Indonesia. The results of the study indicated that job satisfaction among permanent workers was influenced by two key factors: salary and career. Furthermore, job satisfaction of temporary workers was found to be influenced by factors such as assistance from superiors, security, and quality of work. Additionally, factors such as career and pension will increase the level of job satisfaction of the main office staff. In the case of the project staff, their job satisfaction was influenced by the significance of work, control, supervision, and quality of work. Eker et al., (2007) stipulated that the work environment, administrative workload, academic workload, promotion and evaluation, and research fund are also influence on job satisfaction of academicians.

Moreover, previous researchers have identified the influence of demographic factors on job satisfaction. According to Ghafoor (2012), age, experience, education qualification and gender have caused to job satisfaction of academic staff of private and public sector universities in Pakisthan et al., (2006) have mentioned that the job satisfaction of healthcare professionals is affected by job experience. Anywise Amarasena et al., (2015) have revealed that teaching experience, gender, age, highest level of education, marital status and number of children of staff members had no significant effect on the job satisfaction of academic staff of universities in Sri Lanka. These findings may indeed differ from previously mentioned finding due to the incompatibility of the communities on which the studies are based.

3. Methodology

The target population of the study was graduate employees of Sri Lanka's manufacturing industry. The study focused on the main five sub-sectors within the manufacturing industry as the sample population. The sample (n=156) was selected by using the stratified sampling method. The study used primary data to obtain the objective of the study. The questionnaire was used to collect primary data. There were 150 responses received back with a 96% response

rate. The study used descriptive analysis, exploratory factor analysis and Chi square test as the data analysis methods of the study.

The study used 29 items with a Likert-type scale to derive the factors that affect to job satisfaction of graduate employees in the manufacturing industry of Sri Lanka. Initially, the study calculated the mean values of job satisfaction of each employee according to the Likert scale data. And the mean values were rounded to the nearest whole number. Considering rounded values, the study has transformed the continuous variable into an ordered categorical variable. The impact of demographic variables as age, gender, experience and the degree of the employee on job satisfaction is identified by Chi square test.

4. Analysis and Findings

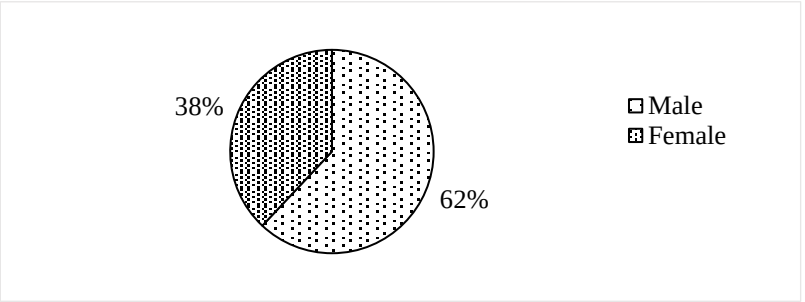
4.1 Reliability Test

The study used Cronbach's alpha to assess the internal consistency of the multiple Likert-type scale. Table 1 shows the reliability test statistics. As per Table 1, Cronbach's Alpha statistics = 0.937 > 0.7 and it indicates a high internal consistency (Peiris, 2018).

4.2 Demographic Characteristics of the Sample

Figure 1 illustrates the distribution of male and female employees in the sample. The data reveals that male employees accounted for the majority, comprising 62% of the sample. In contrast, female employees represented 38% of the sample, indicating a lower proportion compared to males. It is notable that male employees had a higher contribution, comprising more than half of the total sample size.

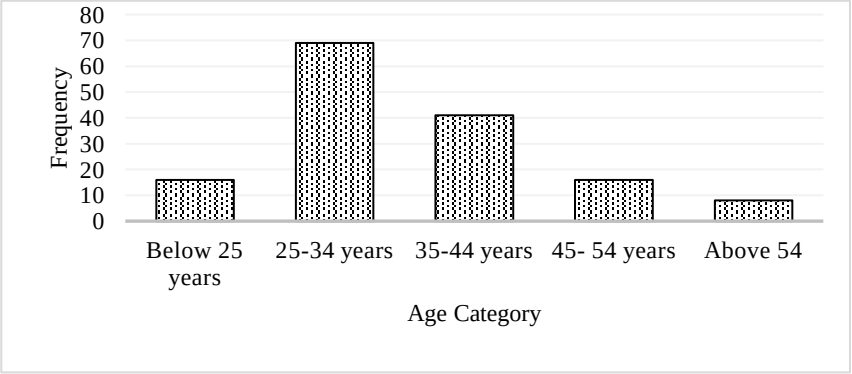
Figure 1: Gender Composition of the Sample



Source: Sampling Survey, 2022

Figure 2 shows the frequency distribution of each age category within the sample. The highest frequency of the age category is “25-34 years” which consists of 69 employees. On the other hand, the "above 54 years" age category has the lowest frequency, with only 7 employees. The “Below 25 years” and “45-54 years” age categories have the same frequencies while the “35-44 years” age category consists of 41 employees.

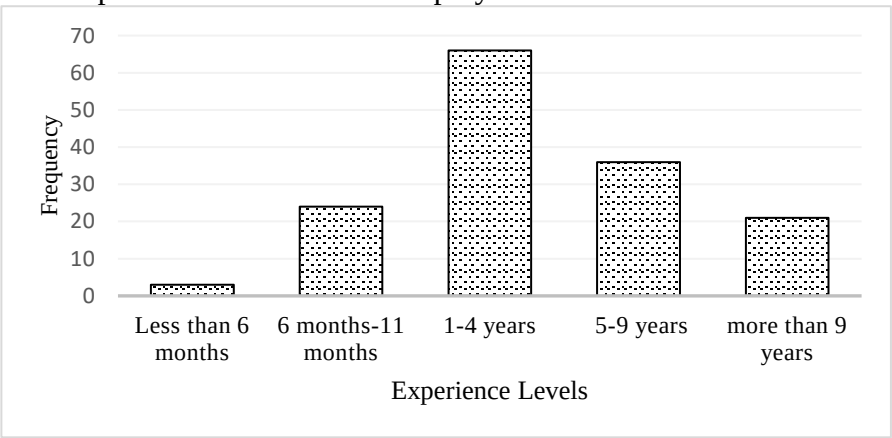
Figure 2: Age Composition of the sample



Source: Sampling Survey, 2022

According to Figure 3, most of the employees in the sample have an experience level of 1-4 years. A significant number of employees also fall within the "5-9 years" experience range. There are 21 employees who possess “more than 9 years” experience and there are 24 employees who are having “6 months -11 months” experience.

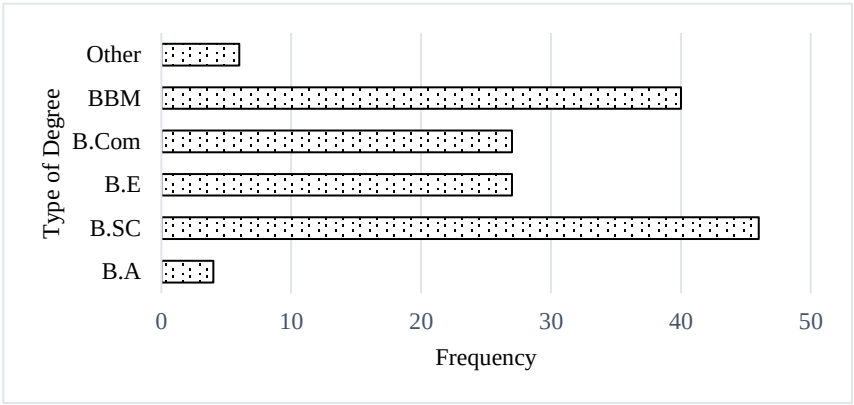
Figure 3: Experience Levels of the Employees



Source: Sampling Survey, 2022

According to Figure 4, majority of the employees of the sample hold a Bachelor of Science (B.Sc.) degree. Conversely, the lowest amounts of employees have obtained a Bachelor of Arts (B.A) degree. Bachelor of Commerce (B. Com) and Bachelor of Engineering (B.E) degrees were obtained by the same number of employees. Additionally, 40 employees hold a Bachelor of Business Management (BBM) degree. Furthermore, 6 employees have not obtained any of the above degrees. They have degrees outside of the mentioned categories, such as PQHRM (MBA), Postgraduate Diploma in Marketing, NDT Polymer Engineering, Associate of Science (A.S.), and APE. Moreover, according to the sampling survey (2020), B.SC, BBM, B.E, and B.com degree holders have more chances to engage with the manufacturing industry of Sri Lanka.

Figure 4: Degrees Obtained by Employees



Source: Sampling Survey, 2022

Table 1: Descriptive Analysis of Overall Job Satisfaction

Demographic Variable	Category of the variable	Job Satisfaction	
		Mean	Std. Deviation
Gender	Male	2.0114	0.3316
	Female	1.9861	0.2746
Age	Below 25 years	2.0458	0.2634
	25-34 years	1.9988	0.31042
	35-44 years	1.9651	0.3292
	44-55 years	2.1545	0.2765
	Above 54 years	1.7897	0.1089
Experience	Less than 6 months	2.3519	0.3337
	6 months-11 months	2.0078	0.3530

	1-4 years	1.9301	0.2557
	5-9 years	2.0591	0.3090
	More than 9 years	2.0741	0.3688
Degree	B.A	1.9340	0.5375
	B.SC	2.0420	0.3595
	B.E	2.0010	0.2105
	B.Com	1.8863	0.2270
	BBM	1.9906	0.2732
	other	2.3356	0.3501

Source: Sampling Survey, 2020

4.3 Identifying Demographic Factors affecting on Job Satisfaction

Table 2: Chi square Test Results of Demographic Variables and Job Satisfaction

Hypothesis	Chi-Square Value	P value	Decision
H_0: There is no significance impact of age on job satisfaction.	2.21	0.331	H_0 is accepted
H_0: There is no significance impact of gender on job satisfaction.	8.60	0.377	H_0 is accepted
H_0: There is no significance impact of experience on job satisfaction.	11.20	0.191	H_0 is accepted
H_0: There is no significance impact of the degree on job satisfaction.	21.93	0.015	H_0 is rejected

Source: Sampling Survey, 2020

According to Table 2, the results indicate age, gender, or job experience do not have a significant impact on employees' job satisfaction. However, the type of degree obtained by employees shows a significant impact on job satisfaction. Therefore, the findings suggest that the degree attained by employees plays a significant role in determining their level of job satisfaction.

5. Factor Analysis

Since KMO=0.924>0.5 and the P-value (sig) of Bartlett's Test=0.000<0.05 the study can have Factor Analysis for data (Williams, Ohsman & Brown, 2010).

According to Table 3, the five components are mainly identified as 1- Company Policies and Supervision, 2- Working Conditions, 3- Work Itself, 4- Recognition and Advancement, 5-Job Security and Human Relationships. The study has identified these factors as the factors which are affecting graduate employees' job satisfaction.

Hence, the five common factors can be written as follow,

Factor 1= $0.223Z_9+0.138Z_{10}+0.280Z_{11}+0.181Z_{12}+0.334Z_{13}+0.302Z_{14}+0.118Z_{17}+0.166Z_{20}$

Factor 2= $0.255Z_{22}+0.251Z_{24}+0.274Z_{25}+0.401Z_{26}+0.317Z_{27}$

Factor 3= $0.276Z_5+0.305Z_6+0.214Z_7+0.328Z_8$

Factor 4= $0.413Z_1+0.397Z_2+0.267Z_3+0.164Z_4$

Factor 5= $0.167Z_{15}+0.367Z_{16}+0.204Z_{18}+0.183Z_{19}+0.374Z_{20}+0.300Z_{21}$

Table 3: Rotated Component Matrix (Extraction Method: Principal Component Analysis)

Attributes	**1**	**2**	**3**	**4**	**5**
Seeing results of work.	.245	.088	.125	**.793**	.221
Work praised.	.094	.211	.285	**.803**	.115
Idea accepted by the company.	.236	.177	.439	**.666**	.081
Received advancement.	.261	.114	.544	**.546**	.097
Varied job.	.060	.025	**.643**	.379	.385
Creative (challenging) job.	.228	.244	**.685**	.303	.157
Opportunity to do a whole job--all phases.	.152	.180	**.560**	.336	.370
Growth in skills, or status	.341	.344	**.669**	.136	.010
Allowed to work without supervision.	**.559**	-.002	.449	.018	.183
Effective organization of work.	**.543**	.355	.370	.342	.067
Beneficial personnel policies.	**.710**	.282	.223	.132	.126
High company status.	**.571**	.221	.340	.141	.240
Supervisor competent.	**.765**	.175	.083	.192	.252
The supervisor delegated work well.	**.700**	.244	.099	.153	.103
Friendly relations with the supervisor.	.437	.150	.283	.272	**.441**
The supervisor is willing to listen to suggestions.	**.483**	.447	-.003	.281	.291
The supervisor gave credit for the work done.	.167	.437	.040	.341	**.531**
Cooperation of people you worked with.	.374	.333	-.069	.383	**.496**
Good working relationship with subordinates.	**.551**	.249	.158	.170	.416
Received wage increase.	.192	.264	.178	.078	**.686**
Amount of salary.	.398	**.591**	.290	.065	.075
Tenure or other objective signs of job security.	.185	.326	.439	-.046	.615
Community and other outside situations.	.252	**.624**	.101	.241	.288
Work in social surroundings.	.255	**.665**	.107	.032	.337

Good physical surroundings.	.137	**.756**	.195	.107	.138
Having a given status.	.180	**.704**	.164	.185	.290
The supervisor went to bat for you with management.	.200	.179	.151	.158	**.655**

Rotation Method: Varimax with Kaiser Normalization.

Source: Sampling Survey, 2022

6. Conclusion and Suggestions

According to the study, 1-Company Policies and Supervision, 2- Working Conditions, 3- Work Itself, 4- Recognition and Advancement, 5-Job Security, and Human Relationships are the factors that have been identified as affecting graduate employees' job satisfaction. Moreover, the satisfaction is changed by the degree obtained by employees. As per the current study other variables could not influence on employees' job satisfaction.

Company policies and supervision mean the administration side of the organization. Hence the employees more consider the behavior of the administration. Employees always expect the positive actions from the administration of the company. If a company needs a more loyal employee, they have to make sure the employees satisfy with their company policies and supervision.

Working conditions is another factor that is identified by the study. As per the Bakotic and Babic (2013) workers under difficult working conditions are dissatisfied with their job. The current study also implied that management should more concern to improve working conditions of the company in order to improve employees' satisfaction.

Work Itself is another factor that is revealed by the study as a factor of job satisfaction. That means the nature of the job or the task that employees have complete also influences employees' job satisfaction. Recognition and advancement are other influential factors of job satisfaction and if employees are received enough recognition and advancement they will satisfy with their job and the organization.

Job security and human relationship also giving impact employees' job satisfaction. The status and stability of the organization was the most influential fact during the Covid-19 pandemic. Hence if the employers can ensure the job security of employees, they will be highly satisfied with their

job. Moreover, all the employees have to deal with different people in the organization as co-workers, supervisors, and administrators. However, employees have close relationships with co-workers and supervisors than others. Hence, these people can make the workplace the worst place or the best place.

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Factors Affecting Online Purchasing Intention of Apparel among Young Customers in Sri Lanka

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Abstract

The volume of online activities has gained rapid momentum owning to accelerated internet penetration and developments in the arena of information communication technologies. This scenario is true not only within the global context but also within the context of Sri Lanka. This research has uncovered the recent trends in the modern-day online shopping space. The existing developments suggest that consumers often search for products online and make their purchases offline. A great proportion of Sri Lanka's young consumers purchase products through the internet. In this research, the researcher examines the factors that affect purchasing intention among young customers with special emphasis on the Western province of Sri Lanka. A questionnaire was utilized as a research instrument and the researcher collected data to investigate this research topic. Descriptive statistics, chi-square analysis and factor analysis were mainly used to analyse the gathered data. The variables utilized in the study are website content, awareness of existence, price of the item, trust in delivery and transaction, advertising, and distribution of information. Ultimately, the researcher has presented a set of recommendations based on the conclusions of the study.

Keywords: Apparel, factor analysis, online purchasing intention, young customers

1. Introduction

The internet is utilized in numerous ways by customers within the business-to-customer (B2C) and electronic commerce (e-commerce) spaces. Some such functions are; uncovering product features, pricing or reviews, selecting

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appropriate products and services among various choices, placing orders, making payments, and other diverse sales services (Sinha, 2010). These days the web isn't solely a networking media, but additionally a definition of dealing for customers in the international market. Conducting business transactions through the internet has become a common phenomenon over the last decade and delivery services, marketing firms, as well as producers of goods and services, are determined to reap maximum benefits from this latest trend (Ziadat, 2013).

According to Gehrt and Yan (2004), the selection of retail formats that are obtainable to today's shoppers is diverse and numerous. It's been quite a decade since e-commerce first evolved (Shergill & Chen, 2005). E-commerce has become a central characteristic of the internet era. According to UCLA (University of California, Los Angelis) Centre for Communication Policy (2001), online shopping is the third preferred internet activity, falling behind email usage and net browsing. At present, B2C electronic commerce has made remarkable progress, in turn acting as a factor that diminishes trade boundaries(Shergill & Chen, 2005). Moshrefjavadi, et al. (2012) concluded that developments made in e-commerce and e-shopping spaces generate opportunities for businesses to expand their clientele and reach global consumers with ease.

According to Cho and Park (2001), over 627 million individuals globally have shopped online at some point in their lives. Liang and Lai (2000) stated that the calculable e-commerce market will hit 228 billion USD in 2007, 258 billion USD in 2008, and 288 billion USD in 2009. It was projected that by 2010 e-commerce would be responsible for nearly 13 percent of total retail sales from a global point of view.

Therefore, online shopping plays a significant role in trade. Most consumers prefer to buy products via the internet at present. Liang and Lai (2000) discovered that the most purchased items via the internet were books (34%), DVDs (22%), airline tickets (21%) and accessories (20%).

The Telecommunication Regulatory Commission of Sri Lanka (TRC) stated that the total of mobile broadband connections has doubled on a year-on-year basis, continually since its introduction in 2009. Moreover, the average growth of connections over the past six years stood approximately at 96.5 percent (TRC, 2018). Fixed internet connections have registered a growth of 68

percent, yet by comparison, the growth seen in mobile broadband services is far superior (Ayoobkhan, 2016). According to Dias and Ranwala (2015), many researchers conducted research based on online shopping behaviour, but many researchers did surveys based on online shopping as a common factor not specifying any products (Dias & Ranwala, 2015). Through this survey, the researcher attempts to determine the factors which influence the online purchasing intention of apparel among the young generation with special reference to the Western province in Sri Lanka.

2. Review of Literature

Unlike communication in physical shopping spaces, which takes a face-to-face form, communication between customer and producer in online spaces happens through the producer's website (Park & Kim, 2003). Ziadat, et al., (2013) pointed out that the internet is perceived not merely as a networking tool in the contemporary world but also as a platform where international transactions take place. This notion is confirmed by According to Delafrooz, et al., (2009), as it was concluded that over 600 million people carried out online shopping activities globally in the year 2009.

Ziadat, et al., (2013) identified four (4) major factors that influenced online buying behaviour; advertising, brand image, trust in the transaction, and consumers' attitude towards e-commerce. Delafrooz, et al. (2009) suggested that creating unique landing pages for specific topics, the convenience of purchasing the product, the price rate of other websites, displaying promotions, and physical viewing were important factors that determined consumers' attitudes toward online shopping. Delafrooz, et al., (2009) manipulated the survey with aid of the findings of Ziadat, et al (2013)'s survey.

Dias and Ranwala (2015) stated that the customer satisfaction rate in Sri Lanka was based on delivering products of apparel at the right time to the right place, website updating, displaying product discounts, price rate of products, the gender of the customer, and submitting personal information and financial information. Udawaththe (2011) mentioned that the decision-making of consumers in online spaces was governed by criteria such as the gender of the consumer, product price, awareness of the brand, security of the transaction, and clarity and familiarity of the webpage.

Brand awareness and product familiarity is created by advertising and marketing strategies that inform consumers of the key features, benefits and

other competitive factors of a certain product or service(Liat & Wuan, 2014). Additionally, word of mouth and mass media also serve the function of creating brand and product awareness (Liat & Wuan, 2014). Thus, promotions are a significant tool that can be utilised to spread the brand name, especially where online services are concerned (Delafrooz, et al., 2009). However, it has been discovered that site awareness is also just as important as online promotions in influencing purchasing decisions of consumers(Delafrooz, et al., 2009). Udawaththe (2011); Dias and Ranwala (2015) concluded that there was a positive impact between the awareness of consumers and the decision of online purchasing behaviour in customers in Sri Lanka.

Lim, et al., (2016) mentioned that the respondents considered the clarity and convenience of the website, comparative superiority of the items, inclusion of a call upon purchase confirmation crucial determinants that influences customer behaviour in Malaysia. Moreover, Lim et al. (2016) mentioned that there was no effect of the price of the product where online apparel purchases were concerned. Hence, the consumers in Malaysia gave importance to quality over price when making apparel purchases via the internet.

Ayoobkhan (2016), Dias and Ranwala (2015), and Udawaththe (2011) emphasized that the highest proportion of respondents was driven by products mentioned on online shopping webpages. Because, when focusing on the global and local context, there were different types of conclusions, and the researcher will be identified the situation based on the apparel materials through this survey.

'Trust' was defined by Dange and Kumar (2012) as the willingness of one to make themselves vulnerable to the actions of another, based solely on the expectation that the said party would accurately perform a particular action, regardless of whether the former is able to monitor or control the later (p.14). It is a long-established fact that most transactions have an element of trust irrespective of their form and the space in which it is carried out. In online spaces trust is a crucial factor in developing sustainable relationships with customers (Uzun & Poturak, 2014). Here customers always submit their personal and financial information to the shopper.

Athapaththu and Kulathunga (2018) state that trusts positively impacts purchase intention. Athapaththu and Kulathunga (2018) mentioned that there was a moderate linear relationship between trust in the transaction and

purchasing behaviour. They investigated this as a factor of the behaviour of online purchasing intention based on Davis's research. These conclusions are presented for the overall online consumer behaviour, not for the apparel products. Hence, the researcher considered the above-investigated factors to manipulate this survey.

3. Research Objectives

The research objectives are;

- To identify the main characteristics of young customers who are purchasing apparel online.
- To identify the association between main variables and previously identified factors affecting to online purchasing intention.
- To identify the risk factors for online purchasing intention for apparel.

4. Research Questions

The research questions are;

- What are the main characteristics of young customers who are purchasing apparel online?
- What is the association between main variables and previously identified factors affecting to online purchasing intention?
- What are the risk factors for online purchasing intention for apparel?

5. Method of Data Collection

A questionnaire was used as the research instrument to gather primary data. All the questions in the research instruments were built up as closed-ended or open-ended questions. The questionnaire was built from the details gathered from the literature review. Under the questionnaire, the researcher states twenty (20) attributes in order to identify the independent variables.

6. Results and Findings

Table 1: Respondents' profile

Characteristics	Categories	N	%
Gender	Male	99	44.4
	Female	124	55.6
Age Group	15-17 years	20	9
	18-20 years	95	42.6
	21-24 years	108	48.4

Marital Status	Single	177	79.4
	Married	44	19.7
	Divorced	2	0.9
Education Level	Student	18	8.1
	A/L	158	75.3
	First Degree	37	16.6
Current Status	Student	18	8.1
	Undergraduate	45	20.2
	Employed	91	40.8
	Self Employed	30	13.5
	Unemployed	38	17
	Other	1	0.4

Source: Survey Data, 2023

Young individuals who frequently shop online were the target population. The sample that was taken to conduct the survey included customers from the Western Province. 250 young customers from different living areas were surveyed. Out of the 250 respondents, 223 replied to the online questionnaire. The profile of the respondents who participated in the study is demonstrated in Table 1.

5.1 Chi-square Analysis

Table 2: Association between main variables and previously identified factors

Categories	Test Statistics χ^2 Value	P value
Create unique landing pages for specific topics	41.784	0.000
The brand image of the product	64.393	0.000
The price rate of the other websites	81.886	0.000
Include a call to action on nearly	118.433	0.000
Research of the apparel item	**87.268**	**0.068**
Advertising of the products	258.486	0.042
Displaying discounts on the product	168.845	0.000
Displaying promotions of the product	83.905	0.001
Favourable Judgement of the website	63.397	0.000
Awareness of the brand or brand family of the product.	258.560	0.000
The honesty of e-commerce in terms of price	241.700	0.003
Presenting the method of the price	105.138	0.001
Provide all the relevant information	67.083	0.000
Submitting the financial information of the customer	284.348	0.000
Submitting personal information of the customer	**56.842**	**0.090**
Keep the website up to date	85.407	0.000

Delivering products of apparel at the right time to the right place	95.946	0.000
Physically viewing (colour) of the product	98.325	0.000
Clear transaction	194.321	0.000
Privacy of the transaction	251.322	0.000

Source: Survey Data, 2023

Table 2 shows that most Pearson Chi-square values (p) are 0.000 for rounded three decimal points. And it implies that the $p < 0.05$. Since the p-value is less than the chosen significance level $\alpha = 0.05$, the null hypothesis (H_0) was rejected. Hence, it can be concluded with 95% confidence that there is a significant relationship between all the statements that are identified from the previous research excluding the statements of research on the apparel item and submitting personal information of the customer. Because the p-values of these statements are > 0.05.

5.2 Use of Exploratory Factor Analysis (EFA)

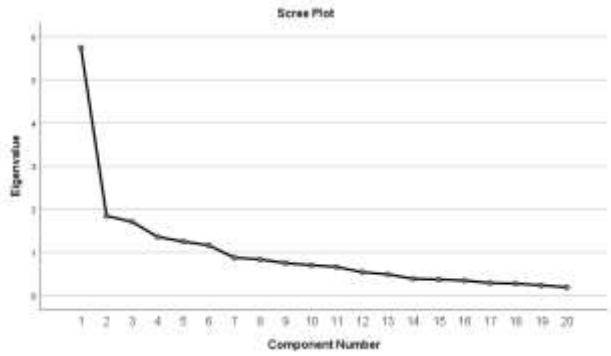
Table 3: Results of KMO and Bartlett's test

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.764
Bartlett's Test of Sphericity	Approx. Chi-Square	1676.432
	df	190
	Sig.	.000

Source: Survey Data, 2023

The significance of Bartlett's Test of Sphericity (Table 3) ratified that the observed correlation matrix is significantly different from the identity matrix, and thus, common factors due to inter-correlation can be investigated. Results in table 3 also indicated that the KMO statistic (0.764) is greater than 0.6, confirming that the data satisfies sample adequacy for EFA.

Figure 1: Scree plot



Source: Survey Data, 2023

Factor analysis is used for identifying the factors affecting online purchasing intention. Factors are extracted based on eigenvalues greater than 1 and the scree plot (figure 1) displays the number of factors. According to figure 1, there are six factors that can be identified under factor extraction.

The main objective of this study is to identify the factors affecting the online purchasing intention of apparel among young customers. According to the variables found in the literature review, there are 20 variables, that have an impact on customer purchasing behaviour.

4.1 Distribution of Factors under the Principal Components (PCF)

The results show that only six components have an eigenvalue greater than 1. Based on the eigenvalue greater than 1, these six components are taken as the main factors, which describe 74% of the variation of the variable considered. Thus, representing six expression sets of 20 variables. However, six components are sufficient to represent all the features. Table 4 shows the distribution of variables, according to the varimax rotation method, relevant to the six main components.

Table 4: Rotated component matrix

	Components					
	1	**2**	**3**	**4**	**5**	**6**
Create unique landing pages for specific topics	**.512**	.400	-.249	-.299	-.212	-.093
The brand image of the product	.456	**.509**	.129	-.245	-.352	-.358

The price rate of the other websites	.335	-.057	**.454**	-.009	.517	.465
Include a call to action on nearly	.019	.511	.190	-.131	.138	**.544**
Research of the apparel item	.396	**.559**	.083	-.146	.047	-.202
Advertising of the products	-.359	.178	.103	-.256	**.603**	.119
Displaying discounts on the product	-.099	-.330	**.549**	.115	-.123	-.084
Displaying promotions of the product	.268	-.306	**.513**	-.505	.232	.220
Favourable Judgement of the website	**.563**	.037	.288	-.115	-.100	.252
Awareness of the brand or brand family of the product.	-.280	**.660**	-.055	-.179	.253	-.099
The honesty of e-commerce in terms of price	-.279	.144	**.555**	.001	-.263	-.106
Presenting the method of the price	.335	-.321	**.576**	-.175	-.039	-.269
Provide all the relevant information	**.447**	-.054	.319	.205	-.453	.394
Submitting the financial information of the customer	.435	.068	-.297	.146	-.375	**.517**
Submitting personal information of the customer	.441	.058	-.025	**.593**	.341	-.244
Keep the website up to date	**.566**	.184	.265	.492	-.024	-.159
Delivering products of apparel at the right time to the right place	.404	-.007	.442	**.483**	.170	.107
Physically viewing (colour) of the product	.006	**.574**	-.641	.042	.013	.180
Clear transaction	-.177	.118	-.409	**.601**	.203	-.258
Extraction Method: Principal Component Analysis.						
a. 6 components extracted.						

Source: Survey Data, 2023

According to table 5, the variables used in the analysis of the factors affecting online purchasing intention of apparel among young customers can be stated

as: website content, awareness of existence, price of the item, trust in delivery and transaction, advertising and distribution of information.

Table 5: Identified factors

Factor 01	
Create unique landing pages for specific topics	**Website content**
Favourable Judgement of the website	
Provide all the relevant information	
Submitting personal information of the customer	
Keep the website up to date	
Factor 02	
The brand image of the product	**Awareness of existence**
Research of the apparel item	
Awareness of the brand or brand family of the product.	
Physically viewing (colour) of the product	
Factor 03	
The price rate of the other websites	**Price of the item**
Displaying discounts on the product	
Displaying promotions of the product	
The honesty of e-commerce in terms of price	
Presenting the method of the price	
Factor 04	
Submitting personal information of the customer	**Trust in delivery & transaction**
Delivering products of apparel at the right time to the right place	
Clear transaction	
Factor 05	
Advertising of the products	**Advertising**
Factor 06	
Include a call to action on nearly	**Distribution of information**
Submitting the financial information of the customer	

Source: Survey Data, 2023

6. Conclusion and Recommendations

6.1 Conclusion

The majority of the sample were female customers and most of the sample units were between 20 – 24 years old. Further, there was a significant association between selected eighteen (18) variables with consumer purchasing intention. Website content, awareness of the existence, price of the product, trust in delivery and transaction, advertising, and distribution of

information were identified as the main factors influencing online purchasing intention among young customers.

6.2 Recommendation

Barr and Weiss (2012), presented the basic process for developing website content of the relevant product, and also Ganguly, et al., (2006) stated details on how to develop website content in the online business based on identifying who will visit the site, then listing the information & tools that each "profile" will want and need, gathering internal ideas, identifying content that you'll need for marketing campaigns, checking out the competitors and generating miscellaneous ideas.

Anchor Pricing is where the supplier displays their "regular" price and then visibly lowers that item's price in stores or online. This has proven to be effective as it creates the illusion that the customer is receiving a worthy deal or saving money (Peters, 2019). At this point, the supplier should know where he will start with pricing the product. To ensure profitability in the long run, the producer must analyse current business statistics and design a proactive action plan (Peters, 2019).

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Solid Waste Source Separation Behaviour and it's Association with Demographic, Socio-Economic, and Local Authority (Involvement Factors at the Household Level in Sri Lanka)

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Abstract

Effective solid waste source separation behavior at the household level plays a pivotal role in modern societal scenarios. Understanding situational and socio-psychological factors, including knowledge, inconvenience, experience, awareness, attitudes, subjective norms, and perceived behavioral control, is critical in improving practical waste separation practices. This study investigated the relationships between demographic, socio-economic and situational and socio-psychological factors on solid waste source separation behavior among households in Sri Lanka. The study was conducted within the positivist paradigm using the deductive method approach. The data were collected by distributing the structured questionnaire to 428 households selected under the cluster sampling strategy in the Western Province. The study revealed significant connections between situational and socio-psychological factors, such as knowledge, convenience, experience, attitudes, subjective norms, and perceived behavioral control on households' solid waste source separation behaviors. The study also identified significant associations between situational and socio-psychological factors and demographic and socio-economic factors. The findings implied that space for an integrative effort for households' solid waste source separation behaviors and its association with demographic, socioeconomic, and local authority engagement is a pre-requisite arrangement for implementing on-bound solid

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waste management techniques in the country's development regime. This suggests the need for effective solid waste source separation behavior among households for improving sustainable development policies and strategies, particularly in developing countries like Sri Lanka, which can be achieved through collaborative and participatory approaches. The study provides valuable insights for policymakers, government agencies, and other stakeholders to improve solid waste management practices and promote sustainable development targets.

Keywords: Demographic factors; Socio-economic factors; Solid waste source separation behavior; Situational and socio-psychological factors; Sri Lanka

1. Introduction

Solid waste generation and management have emerged as critical global issues, intensifying due to rapid population growth. This problem is driven by various human activities, impacting both developed and developing countries. Although considerable efforts have been made to tackle this challenge, persistent generative and managerial issues continue to prevail in rural, estate, and urban sectors. Urban areas, characterized by limited space and numerous industries, contribute significantly to the production of solid waste, exerting adverse effects on socioeconomic activities and the environment (Pongpunpurt, 2022; Kalyanasundaram et al., 2021). In Sri Lanka, at the attempt of waste management, solid waste is classified into degradable and non-degradable waste, with ongoing efforts to recycle and reuse non-degradable waste while drawing insights from successful waste disposal and management practices in other countries (Soysa et al., 2022; McAllister, 2015).

Accordingly, responsible authorities should collaborate with societal communities to find sustainable solutions for managing solid waste generation, including proper disposal and recycling of nondegradable waste (Eshete, Desalegn, & Tigu, 2023). This approach helps local governments reduce waste disposal and recycling costs while promoting systematic waste collection and segregation (Doaemo et al., 2021). Implementing modern recycling strategies can effectively manage solid waste in various areas, and community involvement is crucial in this process (Soysa et al., 2022). To improve waste management, authorities should conduct studies and raise

awareness about waste generation, collection, segregation, and recycling (Kihila, Wernsted, & Kaseva, 2021). Understanding factors affecting waste generation and separation is essential for sustainable waste management (JICA, 2016), and a path-driven approach can guide authorities in efficiently managing solid waste (Noufal et al., 2020; Alhassan, Kwakwa, & Owusu-Sekyere, 2020).

However, despite efforts to promote source separation, disposal, and recycling strategies, most countries face challenges in managing solid waste (Basnayake & Visvanathan, 2014; Fei et al., 2022). Sri Lanka experiences significant socioeconomic and environmental impacts due to solid waste management issues (A Khanal, Giri, & Mainali, 2023). Understanding the effects of demographic and socioeconomic factors on waste separation at the household level is crucial, and new factors need exploration. A comprehensive strategy that involves research, education, and public engagement is necessary to improve waste management attitudes and practices (Mmereki, 2018). Addressing the hidden gap in demographic, socio-economic, and local authority involvement in waste separation is vital to manage solid waste generation effectively.

Local government authorities play a crucial role in solid waste management by recognizing public concerns, knowledge, and behavior and providing necessary infrastructure facilities (Babaei et al., 2015). Understanding situational and socio-psychological factors affecting waste source separation intention is vital for successful waste management and achieving a qualitative improvement in people's livelihoods (Soysa et al., 2022; Eshete, Desalegn, & Tigu, 2023). Public participation in waste management, particularly domestic waste separation, is essential for effective waste disposal and environmental protection. A comprehensive study linking demographic, socio-economic, and local authority involvement characteristics with situational and socio-psychological factors at the household level is necessary to support this endeavor (Gudmann et al., 2021).

2. Research Context

Local government entities in Sri Lanka are responsible for household solid waste management, but they face challenges due to budget constraints and high operating costs (Kumara & Pallegedara, 2020). Over 60% of municipal waste consists of biodegradable and organic waste, but only a portion is

collected daily (Arachchige et al., 2017; Basnayake & Visvanathan, 2014; Central Environmental Authority, 2018). Improper waste disposal practices, such as dumping and burning, are widespread, leading to public health concerns and the spread of diseases like dengue (Fernando, 2019; Abeyewickreme et al., 2012). Despite the National Waste Management Policy's efforts, local governments still struggle to manage household waste, particularly in rural areas (Kumara & Pallegedara, 2020), resulting in environmental hazards like landfill collapses (Geosrilanka, 2017).

The objective of this study is three-fold: firstly, to measure the relationship between situational factors and socio-psychological factors on solid waste source separation behavior at the household level in Sri Lanka, secondly, to measure the association between demographic and socio-economic factors and situational factors on solid waste source separation behavior in the same research context, thirdly, to compare the associations between demographic and socio-economic factors and socio-psychological factors on solid waste source separation behavior within the same context, in order to suggest coping strategies for minimizing the adverse environmental impact of household source separation behavior. This study holds significance as Sri Lanka, a developing country, faces a severe challenge of solid waste management, and research on household behaviors regarding source separation and the influence of demographic and socio-economic factors is lacking in existing studies (Kumara & Pallegedara, 2020).

In the remainder of this paper, a brief literature review, the materials and methods, results and discussion, conclusions and policy implications, and limitations and future research agenda are successively presented.

3. Literature Review

Source separation, the practice of separating solid waste for collection, is not extensively implemented in Sri Lanka, but some efforts exist at the municipal level. Studies from other developing countries shed light on factors influencing public participation in waste management. Ma, Hipel, & Hanson (2017) found situational factors and individual attitudes to be major predictors of behavioral intention regarding solid waste management in China. Zhang et al. (2017) observed varying separation rates among college students in China, with higher success in food waste separation but lower rates for waste electricity, batteries, textiles, and drugs. They also noted that female students were more aware of and willing to act on the consequences of waste mismanagement. Ghani et al. (2013) found positive attitudes to be the best

predictor of food waste separation intention in Malaysia. Similarly, Ma et al. (2018) found that individual attitudes and situational factors significantly influenced behavioral intention for solid waste source-separated collection. Perceived behavioral control and intention also played a role in this behavior (Ma et al., 2018).

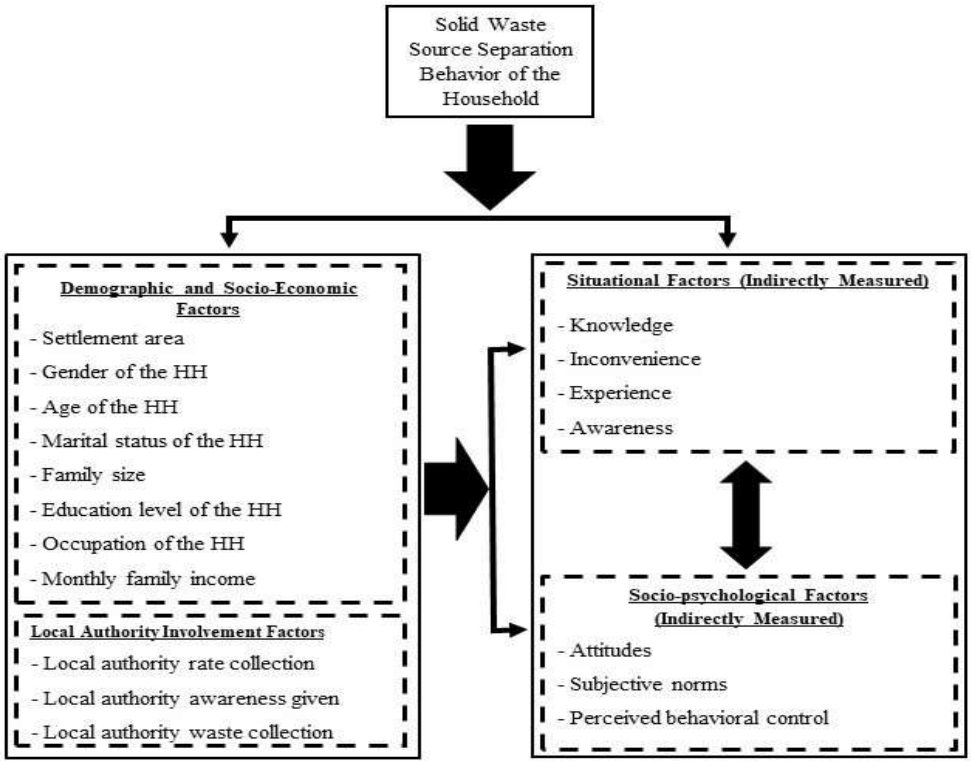
Wang, Dong, & Yin (2018) found that behaviors of others, moral obligations, and facility conditions significantly influence household solid waste (HSW) separation and collection intentions in China. Age, government policies, and perceptions of results were the main factors influencing willingness to pay. Fan, Yang, & Shen (2019) discovered that general and specific environmental motivation and habitual factors significantly affect solid waste sorting behavioral intentions in Shanghai and Singapore, with contextual factors moderating the behavior. Alhassan et al. (2018) identified education level, total income, and occupation type influencing households' HSW separation intentions in Ghana. Convenience, space, availability of a formal source separation system, information, experience, subjective norm, and attitude also influenced HSW separation intentions Ghana. In a related study, Alhassan, Kwakwa, & Owusu-Sekyere (2020) found that monetary incentives, income, service provider type, attitude, and gender, significantly influenced households' source separation behavior in Ghana, while age, employment, household size, housing type, and gender predicted source separation behavior at the household level.

Loan et al. (2017) found that moral norms, trust in local authority, attitude toward sorted waste, and situational factors significantly influence households' behaviors toward organic waste separation in Vietnam. Sarbassov et al. (2019) discovered that 24% of respondents in Kazakhstan had developed a habit of sorting household solid waste despite the absence of a formal separation system. Adzawla et al. (2019) identified solid waste management education characteristics, house type, and location as significant factors affecting households' decision to adopt a particular waste disposal system in Ghana. Padilla & Trujillo (2018) found that households in high socio-economic categories put more effort into solid waste separation in Colombia, while attitudes toward separation were influenced by education level, homeownership, internet use, and affiliation with environmentalist organizations for households in lower socio-economic categories. Kumara & Pallegedara (2020) found that wealthier households in urban areas with older, more educated heads were more likely to use municipal waste collection

arrangements in Sri Lanka while burning and dumping waste were more preferred by households in different socio-economic subgroups, except for those located in urban areas.

Based on the literature review, the researchers developed the conceptual framework shown in Figure 1. The questionnaire for collecting data for the study was designed following the developed conceptual framework. The conceptual framework of the study can be illustrated as follows.

Figure 1: Conceptual framework of the study



Source: Created by the researcher

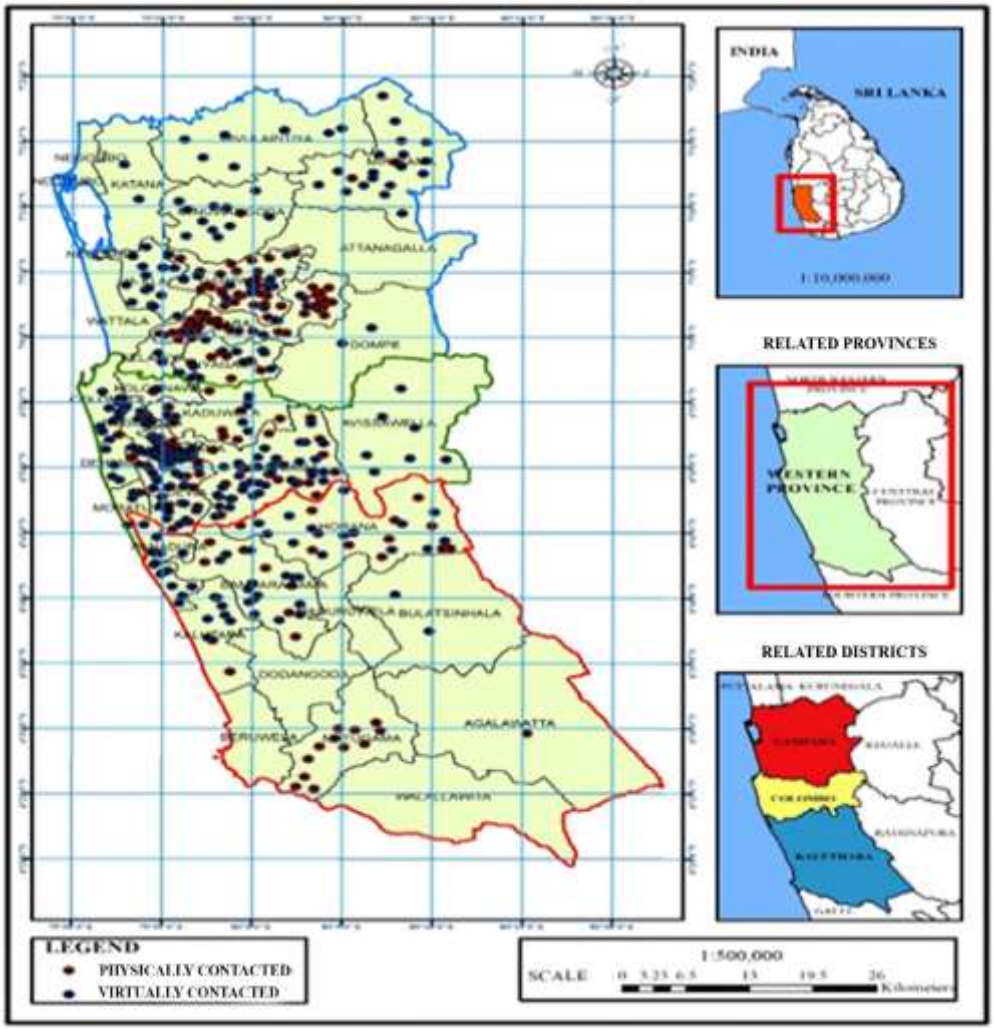
3. Materials and Methods

The study was conducted within the positivist paradigm using the deductive method approach. As the main constituent of the study was purely quantitative, a method was applied to investigate the relationships and associations between demographic and socio-economic factors and situational and socio-psychological factors on the behavior of source separation of solid wastes at the household level. The most problematic area regarding solid waste

generation in Sri Lanka is the country's Western Province. As such, Colombo, Gampaha, and Kalutara Districts of the Western Province were selected on a judgemental basis. These districts are good residential areas that represent both urban and rural areas have faced the serious issue of solid waste management over the years. These three districts have the highest residential population, good geographical and climatic conditions with a minimum impact of natural hazards, and also benefit the interventionist actions of the government. Thus, these districts were deemed appropriate for the study. For the sampling procedure, two main approaches were adopted: keeping control of the household group identified based on a cluster sampling strategy to distribute the hard copies of the questionnaire and reaching households using Google form through the social media contact links adjusting to the Covid-19 pandemic and time restrictions for completing the main survey. The survey strategy of these two approaches was to cover the sampling population to represent households in urban areas and rural areas. Further, researchers made every possible effort to keep the randomness in sampling units with different demographic and socio-economic characteristics as these attributes are reported to influence households' behavior of solid waste source separation. Additionally, the representation of households was aligned with the total sample size of the study. Applying Krejchie and Morgan sample selection formula (Krejchie & Morgan, 1970), the minimum sample size of 385 was obtained by assuming a 5% sampling error, 95% confidence interval, and a standard population proportion of 50%.

However, the sample size was increased by 5% households to allow for more general inferences about the population (Cohen, 1992) and to carter for households that may not corporate during the survey. Therefore, the survey covered a sample size of 404 representing households in both rural and urban areas. The chart of the sampling procedure and map of Western Province (the area of this study) are presented in Figure 2.

Figure 2: Map for Western Province with Districts and Sampling Area with Response Units



Source: Created by the researcher

For this study, both primary and secondary data were collected. A structured questionnaire was developed as the main instrument to gather the primary data related to solid waste source separation behavior at the household level. Full details of the questionnaire are shown in Table 1.

Table 1: Details of the variables of the study

Variable	Description	Measurement
Solid Waste-Related Measures (Response Variables)		
SWSSIH	Solid waste source separation intention of the household	3 if the household source separates regularly, 2 if the household source separates sometimes, and 1 if not
Solid Waste Generation at Household (The source of generating solid wastes Mostly)		
WSWGM_KT	Kitchen	Rank values from 1 to 4 numbers
WSWGM_GD	Garden	
WSWGM_GO	Goods brought from the outside	
WSWGM_OT	Other	
Demographic and Socio-economic Factors		
AHH	Age of the head of the household	Number of years
MSHH	Marital status of the head of the household	3 if other, 2 if the household head is not married, 1 if the household is married
GHH	Gender of the head of the household	2 otherwise, 1 if the household head is male
ELHH	Education level of the head of the household (Human Capital)	Measurement of an ordinal scale
OHH	Occupation of the head of the household	Measurement of a nominal scale
NPH	Number of persons in the household	Number of persons
MIH	Monthly income of the household	Amount in rupees
Solid Waste Management Actions of Local Authority		
WRCLA	Whether rates (Assessment Tax) will be charged	2 if not charged, 1 if charged
NOWMHL	Regarding the need for waste management at the household level	2 if not make people aware by the local authority,1 if Make

		people aware by the local authority
CSWLA	The collection of solids waste by the local authority is occurred or not	2 if not occurred, 1if occurred
Geographical Location (Settlement Area) as the Moderator Variable		
SAH	The residential sector of the household (Urban-all areas governed by either Municipal Council or Urban Council) (Rural- all areas which do not belong to the urban sector or estate sector)	1 if Urban 2 if Rural
Situational Factors on Solid Waste Source Separation (SWSS)		
IKHH_SWSS - Information on knowledge of the head of the household on SWSS	Head of the household's knowledge on solid waste source separation at household	Measurement of a seven-point Likert scale
IHH_SWSS - Inconvenience of the head of the household on SWSS	Head of the household's perception about the condition that makes it challenging to adopt solid waste source separation at household	Measurement of a seven-point Likert scale
EHH_SWSS - Experience of the head of the household	Head of the household's experience with solid waste source separation at household	Measurement of a seven-point Likert scale
IAHH_SWSS - Information on awareness of the head of the household	Head of the household's knowledge and awareness on environmental and related laws and policies on solid waste source separation at household	Measurement of a seven-point Likert scale

Socio-psychological Factors on Solid Waste Source Separation (SWSS)		
AHH_SWSS - Attitudes of the head of the household on SWSS	Head of the household's perception about the attitude towards solid waste source separation at household	Measurement of a seven-point Likert scale
SNHH_SWSS - Subjective norm of the head of the household on SWSS	Head of the household's perception about the ability to perform the subjective norm on solid waste source separation at household	Measurement of a seven-point Likert scale
PBCHH_SWSS - Perceived behavioral control of the head of the household on SWSS	Head of the household's perception of the ability to perform behavioral control on solid waste separation at household	Measurement of a seven-point Likert scale

Source: Constructed by the researcher

In this study, IBM Statistical Package for Social Sciences (SPSS) version 22 was used to analyze the respondents' answers. Descriptive statistics were used to explore the basic information. Actual counts, relative percentages, and means were used in the descriptive analysis to illustrate the sample's characteristics. Next, the Likert scaled data were used to discover variables related to solid waste source separation behavior (situational factors; knowledge, inconvenience, experience, and awareness) and socio-psychological factors; attitudes, subjective norm, and perceived behavioral control of households. The descriptive statistics, Pearson correlation, and χ^2 test were applied to determine relationships and associations between demographics and socioeconomic factors and situational and socio-psychological factors on households' solid waste source separation behaviors. At a significance level of less than 0.10, the Chi-square and Pearson tests were applied to investigate the relationship and associations between demographic and socioeconomic variables and situational and socio-psychological factors on households' source separation behavior.

4. Results and Discussion

This section aims to discuss the demographic, socio-economic characteristics of the respondents and local authority characteristics as well as the results of the associations between source separation behavior of the household and

demographic, socio-economic, and local authority involvement in solid waste source separation related to a sample of 428 households represented by both the urban and rural sectors as 182 from urban settlement and 246 from a rural settlement.

4.1 Demographic and Socio-Economic Characteristics (DSECs) of the Respondents

Table 1: Respondent's (Household's) Demographic and Socio-Economic Characteristics

Settlement/Residential Area		Urban		Rural	
		N	%	N	%
Gender of the household head	Male	165	90.7	207	84.1
	Female	17	9.3	39	15.9
Age of the household head	Less than or equal to	37	20.3	41	15.8
	Greater than 40 to 50	62	34.1	78	31.7
	Greater than 50 to 60	50	27.5	92	37.4
	Greater than 60 years	33	18.1	35	14.2
Overall Mean = 50.36, Overall SD = 10.309		Mean = 50.09, SD = 10.90		Mean = 50.56, SD = 9.87	
Marital status of the household head	Married	166	91.2	224	91.1
	Unmarried	16	8.8	22	8.9
Education level of the household head	Up to lower secondary	29	15.9	56	22.8
	Secondary or	69	37.9	105	42.7
	Tertiary or equivalent	29	15.9	41	16.7
	Postgraduate degree or equivalent	55	30.2	44	17.9
Occupation of the household head	Retired/Pension holder	32	17.6	29	11.8
	Private sector	45	24.7	45	18.3
	Public sector employee	74	40.7	100	40.7
	Employer/Entrepreneur	16	8.8	48	19.5
	Other	15	8.2	24	9.8
Number of persons in the family (Family size)	Less than or equal 2	17	9.4	18	7.3
	Greater than 2 to 5	71	39.0	122	49.6
	More than 5	94	51.6	106	43.1
Overall Mean = 4.55, Overall SD = 1.48		Mean = 4.61, SD = 1.49		Mean = 4.50, SD = 1.47	

Monthly family Income	Less than Rs.30000.00	6	3.3	23	9.4
	Rs.30000.00-Rs.100000.00	50	27.5	98	39.8
	Greater than Rs.100000.00	126	69.2	125	50.8

Source: Constructed by the researcher

Table 2 illustrates respondents' demographic characteristics based on their settlement. Irrespective of the settlement, the majority of the sample consisted of household heads as male respondents, accounting for 90.7% and 84.1% from urban settlements and rural settlements. When considering respondents' age, most are from the mid-age group between 40-60 years old. More importantly, 91.2% of the urban and 91.1% of the rural settlements' household heads in the sample were reported to be married.

Table 2 also shows that 37.9% and 42.7% of the respondents have a secondary or equivalent education level, 30.2%, and 17.9% have a postgraduate degree or equal education, while 15.9% and 22.8% have below lower secondary education in the urban settlement and the rural settlement, respectively.

As shown in Table 2, household heads occupation takes a similar percentage of 40.7 for both urban and rural as the majority. 8.2 and 9.8 respectively, from urban and rural occupied in other categories, while 17.6 from urban and 11.8 from rural are retired household heads. Further, most of the families have a monthly income greater than Rs.100,000, accounting for 69.2% in the urban area and 50.8% in the rural area. However, urban families have a slightly higher monthly income than rural families.

4.2 Local Authorities Involvement in Solid Waste Management

As shown in Table 3, 85.7% of the urban residents are charged with assessment tax compared to 45.5% of the rural residents. A mere 53.8% of the urban residents are provided required knowledge of waste management at the household level. In contrast, 67.9% of rural residents are unaware of the given matter. Almost all the urban residents (91.8%) waste are collected by the local authority. On the other hand, 39.8% of residents from rural areas have access to waste pickup services from the local authority, while 60.2% of residents are deprived of such services.

Table 3: Local Authorities Involvement in Waste Management

Settlement/Residential Area		Urban		Rural	
		N	%	N	%
Rates collection	Do	156	85.7	112	45.5
	Not do	26	14.3	134	54.5
Awareness	Provided	98	53.8	79	32.1
	Not provided	84	46.2	167	67.9
Waste collection	Do	167	91.8	98	39.8
	Not do	15	8.2	148	60.2

Source: Constructed by the researcher

4.3 Respondents' Solid Waste Source Separation (SWSS) Behaviour at Household Level

Residents from both settlements habitually separate solid waste at the household level, 48.4% and 46.3% in urban and rural areas, respectively. However, 26.4 of the urban and 23.2 of the rural are not conducting waste source separation at the household level (Table 4).

Table 4: Solid Waste Source Separation Practice at Household Level

Settlement/Residential Area		Urban		Rural	
		N	%	N	%
Solid waste source separation at the household level	Do not	48	26.4	57	23.2
	Do sometimes	46	25.3	75	30.5
	Do regularly	88	48.4	114	46.3

Source: Constructed by the researcher

4.4 Level of Situational and Socio-Psychological Factors (SSPFs) on SWSS among Households

The situational and psychological factors among households include seven factors, namely; knowledge, inconvenience, experience, awareness, attitude, subjective norm, and perceived behavioral control. The highest level reported in each factor with its respondents' score group, mean value and standard deviation is; knowledge (good: 26-35, 28.8, and 5.375), inconvenience (high, 25-35,15.43, and 9.168), experience (high: 25-35, 27.73, and 5.866), awareness(good: 25-35, 20.56, and 8.380), attitude (positive: 26-35, 31.96, and 4.442), subjective norm (high: 26-35, 23.64, and 8.450), and perceived behavioral control(low: 26-35, 29.5, and 6.787). Overall, more than 60% of

total respondents are in a good /high level of situational and psychological factors among households, namely; knowledge, inconvenience, experience, awareness, and subjective norm, while 94.2% of respondents are in the positive level of attitudes among households and 82.9% of total respondents are in the low level of perceived behavioral control among households. Table 5 shows the levels of each situational and socio-psychological factors with its frequency of respondents, their score groups, overall mean and standard deviation, and individual factor mean, and standard deviations as follows.

Table 5: Level of Situational and Socio-Psychological Factors

Level of SSPFs	**Respondent's score group**	**Frequency (%)**
Level of knowledge		
Good	26-35 (Mean: 30.86 SD: 2.592)	350 (81.7)
Moderate	16-25 (Mean: 21.79 SD: 2.353)	61 (14.3)
Low	6-15 (Mean: 11.53 SD: 2.478)	17 (4.0)
Mean: 28.80 SD: 5.375		
Level of inconvenience		
High	25-35 (Mean: 29.53 SD: 2.769)	258 (60.3)
Moderate	15-24 (Mean: 19.93 SD: 3.532)	70 (16.3)
Low	5-14 (Mean: 8.74 SD: 2.368)	100 (23.4)
Mean: 15.43 SD: 9.168		
Level of experience		
High	25-35 (Mean: 29.89 SD: 2.521)	356 (83.2)
Moderate	15-24 (Mean: 21.30 SD: 2.858)	43 (10.0)
Low	5-14 (Mean: 10.66 SD: 2.636)	29 (6.8)
Mean: 27.73 SD: 5.866		
Level of awareness		
Good	25-35 (Mean: 28.49 SD: 3.108)	177 (41.4)
Moderate	15-24 (Mean: 20.66 SD: 2.505)	123 (28.7)
Low	5-14 (Mean: 9.51 SD: 2.453)	128 (29.9)
Mean: 20.56 SD: 8.380		
Level of attitudes		
Positive	26-35 (Mean: 32.86 SD: 2.279)	403 (94.2)
Neutral	17-25 (Mean: 22.38 SD: 2.755)	13 (3.0)
Negative	8-16 (Mean: 12.25 SD: 2.491)	12 (2.8)
Mean: 31.96 SD: 4.442		

Level of subjective norm		
High	26-35 (Mean: 30.00 SD: 2.701)	224 (52.3)
Moderate	16-25 (Mean: 22.31 SD: 2.535)	115 (26.9)
Low	6-15 (Mean: 9.35 SD: 2.825)	89 (20.8)
Mean: 23.64 SD: 8.450		
Level of perceived behavioral control		
Low	26-35 (Mean: 31.56 SD: 2.802)	355 (82.9)
Moderate	16-25 (Mean: 22.55 SD: 2.948)	42 (9.8)
High	6-15 (Mean: 9.19 SD: 3.177)	31 (7.3)
Mean: 29.05 SD: 6.787		

Source: Constructed by the researcher

4.4 Association between DSECs and SSPFs

Pearson Chi-Square testing method was used to find out the associations between DSECs and SSPFs with the levels of significance set at 1% (Highly Significant), 5% (Significant), and 10% (Marginally Significant).

Table 6: Association between DSECs and Knowledge of SWSS

Demographic Socio-economic characteristic	**Situational Factor - Knowledge**		
	Pearson Chi-Square	**df**	**P-value**
1. Settlement	5.408	2	0.067
2. Gender	0.542	2	0.763
3. Age	5.988	6	0.425
4. Marital Status	1.756	2	0.416
5. Education	7.086	6	0.313
6. Occupation	35.475	8	0.000
7. Family size	0.68	4	0.954
8. Family income	2.767	4	0.598
9. Local authority rate collection	0.411	2	0.814
10. Local authority awareness	3.775	2	0.151
11. Local authority waste collection	4.179	2	0.124

Source: Constructed by the researcher

The results of the associated DSECs and SSPFs are presented and described. Table 6 shows the associations between DSECs and the knowledge under SSPFs. The results indicate that the occupation under DSECs has a highly significant association with knowledge at a 1% (p=0.000) significance level. In addition, the settlement (urban/rural) under SSPFs has a marginally significant association with knowledge at a 10% (p=0.067) significance level.

Further, the results show that other SSPFs except occupation and settlement, had no statistically significant associations (P>0.1) with knowledge (gender – p = 0.763, age – p=0.425, marital status – p = 0.416, education – p = 0.313, family size – p = 0.954, family income – p = 0.598, local authority rate collection p = 0.814, local authority awareness – p = 0.151, and local authority waste collection – p = 0.124).

The results indicated that the knowledge is highly significant with the occupation at a 1% (P = 0.000) level of significance for the solid waste source separation behaviour of HH. This result is consistent with the findings of Laor et al. (2018); Babaei et al. (2015) emphasizing that public-sector employees were more knowledgeable than retired, private-sector employees and employers /entrepreneurs. However, the results of the study are not consistent with those of the study by Laor et al. (2018) that was conducted in Thailand, which recorded significant relationships between knowledge and age/education. According to Wang et al. (2020), knowledge reported a significant relationship with education. Based on the results of the present study, other demographic factors did not affect the knowledge and include gender, age, marital status, education, family size, family income, local authority rate collection, local authority awareness, and local authority waste collection. However, people who have more knowledge and tracking background on perfect married life, equitable gender, well education, balanced family size sustainable family income, well aware of rating, waste management, and regulation awareness and waste collection by the local authority are key factors for the society to maintain sustainable waste management with maintaining their solid waste source separation intension of HH, and positive attitudes, having a standard family status and perceived behavioral control. Without approaching knowledge generation on household waste management, any country or its subsidiaries are not in a position to frame a consistent policy for proper waste management policy (Almasi et al., 2019). Therefore, knowledge of solid waste management relating to these DSECs is crucial to formulate and implement sustainable development programs, including strategic environmental management programs.

Table 7 shows the associations between DSECs and the inconvenience under SSPFs. The results indicate that the settlement and local authority waste collection under SDCs have highly significant associations with

inconvenience at a 1% (p = 0.001, p = 0.000) level of significance. In addition, the local authority rate collection has significant associations with inconvenience at a 5% (p=0.014) level of significance. Also, the DSECs, local authority awareness, and education have marginally significant associations with inconvenience at a 10% (p = 0.058, p = 0.059) significance level. The results show that other SSPFs with the exception of those that have significant associations had no statistically significant associations (P>0.1) with inconvenience (Gender – p = 0.947, Age – p = 0.931, Marital Status – p=0.138, Occupation – p = 0.897, Family size – p = 0.816, and Family Income – p = 0.467).

Table 7: Association between DSECs and Inconvenience on SWSS

Demographic Socio-economic characteristic	Situational Factor - Inconvenience		
	Pearson Chi-Square	df	P-value
1. Settlement	24.033	2	0.000
2. Gender	0.109	2	0.947
3. Age	1.876	6	0.931
4. Marital Status	3.964	2	0.138
5. Education	12.115	6	0.059
6. Occupation	3.53	8	0.897
7. Family size	1.557	4	0.816
8. Family income	3.575	4	0.467
9. Local authority rate collection	8.568	2	0.014
10. Local authority awareness	5.681	2	0.058
11. Local authority waste collection	15.151	2	0.001

Source: Constructed by the researcher

Results indicate that inconvenience is highly significant with a 1% (P = 0.000) significance level for the solid waste source separation intention of HH. Also, local authority rate collection and local authority waste collection have higher significant relationships at a 1% (p = 0.014, p=0.001) level of significance for the solid waste source separation behaviour of HH. Education and local authority awareness also have marginally significant relationships with inconvenience at a 10% (p = 0.059, p = 0.058) level of significance for solid waste source separation behavior. Out of these eleven DSECs, other relationships between inconvenience and DSECs, gender, age, marital status, occupation, family size, and family income were not significant for HH's solid waste source separation intention. Generally, in waste management, there are

many problems that both authorities and the community face many inconveniences due to improper waste generation, collection, and transport as well as disposal issues on its situational approach. In that sense, authorities may find it challenging and would find it difficult to make the policies and their aligned strategies to mitigate the waste management issues, so it may be inconvenient to look into the proper waste separation intention of HH as well as in the societal context (Chen et al., 2017) as per the situational basis. However, well-educated people than others (in urban or rural areas having favorable attention to their rate structure and enforcement and technical awareness on waste management, and their economic, social, cultural, and esteem family background) have a higher level of waste separation behavior to maintain a threatless sensitive natural environment.

Table 8 shows the associations between DSECs and the experience under SSPFs. The results indicate that there was no statistically significant association between DSECs and the respondents' experience on SWSS, for which settlement ($p = 0.472$), gender ($p = 0.609$), age ($p = 0.312$), marital status ($p = 0.951$), education ($p = 0.697$), occupation ($p = 0.574$), family size ($p = 0.326$), family income ($p = 0.428$), local authority rate collection ($p = 0.762$), local authority awareness ($p = 0.868$), and local authority waste collection ($p = 0.979$) were also tested.

Table 8: Association between DSECs and Experience on SWSS

Demographic Socio-economic characteristic	**Situational Factor - Experience**		
	Pearson Chi-Square	**df**	**P-value**
1. Settlement	1.503	2	0.472
2. Gender	0.991	2	0.609
3. Age	7.097	6	0.312
4. Marital Status	0.099	2	0.951
5. Education	3.852	6	0.697
6. Occupation	6.653	8	0.574
7. Family size	4.638	4	0.326
8. Family income	3.125	4	0.428
9. Local authority rate collection	0.544	2	0.762
10. Local authority awareness	0.283	2	0.868
11. Local authority waste collection	0.043	2	0.979

Source: Constructed by the researcher

Moreover, the results indicated that all relationships between experience and DSECs were found to be not significant. Here, the experience on solid waste source separation intention is to be gained by educating especially on general education plus technical context and being properly aware, by referring to the updated information on legitimation, practicing, and standardization of waste management content. Though the findings of this study indicated an insignificant relationship with experience, it is not consistent with the findings of Pongpunpurt (2022). The results show that the higher experienced people (mature people, with higher awareness upper social and living standards, married with happy and enjoyable family members, wealthy economic background) living in the local authorities' areas (LAs who implement effective waste management programs) show an intention for referring to an effective waste separation. Furthermore, Pongpunpurt et al. (2022) emphasized that the local authorities should make policy changes to refer to the people well and refer to people making a real effort to a healthy environment by adding economic value to their living society.

Table 9: Association between DSECs and Awareness of SWSS

Demographic Socio-economic characteristic	**Situational Factor – Awareness**		
	Pearson Chi-Square	**df**	**P-value**
1. Settlement	7.867	2	0.020
2. Gender	1.124	2	0.570
3. Age	7.283	6	0.295
4. Marital Status	2.052	2	0.358
5. Education	2.699	6	0.846
6. Occupation	11.678	8	0.166
7. Family size	14.734	4	0.005
8. Family income	1.36	4	0.851
9. Local authority rate collection	2.271	2	0.321
10. Local authority awareness	4.58	2	0.101
11. Local authority waste collection	1.43	2	0.489

Source: Constructed by the researcher

Table 9 shows the associations between DSECs and awareness under SSPFs. The results indicate that the family size under DSECs has a highly significant association with awareness at a 1% ($p = 0.005$) significance level. Also, the settlement under SSPFs has a significant association with awareness at a 5% ($p = 0.020$) significance level. Then, local authority awareness under SSPFs

has a marginally significant association with awareness of SWSS at 10% (p = 0.101). Further, the results show that other SSPFs except occupation, family size, settlement, and local authority awareness, had no statistically significant associations (P>0.1) with awareness (gender – p = 0.570, age – p = 0.295, marital status – p = 0.358, education – p = 0.846, occupation, p = 0.166, family income – p = 0.851, local authority rate collection p = 0.321, and local authority waste collection – p = 0.489).

Further, in terms of waste separation behaviour through awareness, three DSECs influenced the awareness, namely, family size, settlement, and local authority awareness, which recorded high significance, significance, and marginal significance at 1% (p = 0.005), 5% (p = 0.020), and 10% (p = 0.101) respectively. These findings agree with Akil et al. (2015) indicating that well-educated and experienced people are increasing their awareness of legitimate, subjective, and technical content on waste management. In the Sri Lankan context, most people in urban areas than rural areas, in local authorities are more aware of waste management than others. If the local authorities implement internationally well-designed and standardized waste management programs, it would be better to create an intentional, positive and open psychological effect among the people for creating a best-practiced waste management culture in the society. Furthermore, according to Bruvoll, Halvorsen, and Nyborg (2002), waste disposal with a positive waste separation intention in households can be successfully implemented by referring to well-educated, experienced, and highly aware people sacrificing their time and the fullest effect of all DSECs.

Table 10 shows the associations between DSECs and the attitude under SSPFs. The results indicate that there was no statistically significant association between DSECs and the respondents' attitudes on SWSS, for which settlement (p=0.448), gender (p = 0.861), age (p = 0.748), marital status (p = 0.704), education (p=0.627), occupation (p = 0.198), family size (p = 0.423), family income (p = 0.423), local authority rate collection (p = 0.759), local authority awareness (p = 0.977), and local authority waste collection (p = 0.472) were also tested.

Table 10: Association between DSECs and Attitudes on SWSS

Demographic Socio-economic characteristic	Situational Factor - Attitudes		
	Pearson Chi-Square	df	P-value
1. Settlement	1.605	2	0.448
2. Gender	0.3	2	0.861
3. Age	3.473	6	0.748
4. Marital Status	0.703	2	0.704
5. Education	4.369	6	0.627
6. Occupation	11.058	8	0.198
7. Family size	3.168	4	0.53
8. Family income	3.878	4	0.423
9. Local authority rate collection	0.55	2	0.759
10. Local authority awareness	0.047	2	0.977
11. Local authority waste collection	1.5	2	0.472

Source: Constructed by the researcher

The results indicated that all relationships between attitudes and DSECs were found to be not significant. However, these results are consistent with the findings of Azmin et al. (2022). However, Yaziz and Rahman (2015) found that their sampled (16.2%) respondents aged 17 years old were more likely to have a good attitude than others, contributing to their successful willingness to participate in solid waste separation intension and disposal, especially for recycling. Further, (Almasi et al., 2019) found that attitudes were significantly related to waste management context. However, the present study's findings show that awareness programs in the Sri Lankan waste management scenario are somewhat at a moderate level. Some local government institutions and their associated bodies implement successive solid waste management and disposal programs with a higher weight on awareness, whereas other bodies implement waste management with a little considerable mandate. Further, in Sri Lanka, there are enough legal proceedings as well as governing mechanisms and facilitating infrastructure up to a certain extent. But, it is still not at a satisfactory level, which is evident by the opinions that were expressed by the respondents expressed in the data collection process. Considering the matters, furthermore, Pongpunpurt et al. (2022) emphasized that the local authorities should give the fullest attention, again and again, to refer to the people well and to make a real effort adhering to the necessity of being aware of the effective solid waste management and its core contribution to the

country's economy with an emphasis of maintaining a sustainable environment by adding an economic value to their living society.

Table 11 shows the associations between DSECs and the subjective norm under SSPFs. The results indicate that there was no statistically significant association between DSECs and the respondents' subjective norm on SWSS, for which settlement (p = 0.159), gender (p = 0.151), age (p = 0.844), marital status (p = 0.426), education (p = 0.500), occupation (p = 0.533), family size (p = 0.208), family income (p = 0.703), local authority rate collection (p = 0.241), local authority awareness (p = 0.659), and local authority waste collection (p = 0.182) which were also tested.

Table 11: Association between DSECs and Subjective Norm on SWSS

Demographic Socio-economic characteristic	**Situational Factor - Subjective Norm**		
	Pearson Chi-Square	**df**	**P-value**
1. Settlement	3.681	2	0.159
2. Gender	3.78	2	0.151
3. Age	2.711	6	0.844
4. Marital Status	1.709	2	0.426
5. Education	12.607	6	0.500
6. Occupation	7.036	8	0.533
7. Family size	5.882	4	0.208
8. Family income	2.181	4	0.703
9. Local authority rate collection	2.844	2	0.241
10. Local authority awareness	0.835	2	0.659
11. Local authority waste collection	3.406	2	0.182

Source: Constructed by the researcher

Additionally, the results of the present study indicated that the subjective norm have no significant association with DSECs for solid waste source separation behavior of HH in Sri Lanka. The subjective norm in the sense of waste management is the motive to visit places according to their willingness and economic strength, to purchase their goods, consume to fulfill their requirements, and other fulfillments with aspirations that would positively or adversely affect their lives, which people use to manage their lives. However, people wish to fulfill their requirements according to societal standards and they are expected to practice such norms without disturbing other societal members. The subjective norm varies according to each DSECs in this study. Especially, high-income families in urban areas, evidenced in the Sri Lankan

context practicing their norm, several instances were found where the activities on their lifestyle and waste generation were adversely as well as negatively affected in managing solid waste source separation as well as disposal up to a certain extent.

Table 12 shows the associations between DSECs and the perceived behavioral control under SSPFs. The results indicate that gender under DSECs has a highly significant association with perceived behavioral control at a 1% ($p = 0.000$) significance level. Also, marital status under SSPFs has a significant association with perceived behavioral control at a 5% ($p = 0.046$) level of significance. In addition, the age under SSPFs has a marginally significant association with perceived behavioral control at a 10% ($p = 0.072$) level of significance. Further, the results show that other SSPFs with the exception of gender, marital status, and age, had no statistically significant associations ($P>0.1$) with perceived behavioral control (settlement – $p = 0.951$, education – $p=0.743$, occupation – $p = 0.583$, family size – $p = 0.522$, family income – $p = 0.849$, local authority rate collection $p = 0.204$, local authority awareness – $p = 0.370$, and local authority waste collection – $p = 0.174$).

Table 12: Association between DSECs and Perceived Behavioral Control on SWSS

Demographic Socio-economic characteristic	**Situational Factor – Perceived Behavioral Control**		
	Pearson Chi-Square	**df**	**P-value**
1. Settlement	0.101	2	0.951
2. Gender	0.728	2	0.000
3. Age	11.565	6	0.072
4. Marital Status	6.179	2	0.046
5. Education	3.508	6	0.743
6. Occupation	6.573	8	0.583
7. Family size	3.217	4	0.522
8. Family income	1.372	4	0.849
9. Local authority rate collection	3.178	2	0.204
10. Local authority awareness	1.989	2	0.370
11. Local authority waste collection	3.503	2	0.174

Source: Constructed by the researcher

According to Cheng et al. (2020), perceived behavioral control is a highly considerable socio-psychological factor in the case of solid waste separation

intention of HH. Further, this is related to self-mental control in the daily practice of solid waste separation. This emphasizes the community's sensitivities regarding whether they can demonstrate their behavior and how easily it is demonstrated in their lives. Matching these sensitivities or perceptions in a socio-psychological context affects the practice for building up a motive to encourage solid waste source separation. Integrating other situational and socio-psychological factors would create a paradigm shift by controlling their mental integrity to perform their waste separation without having no more prolonged difficulties or inconveniences. The results of the present study show that perceived behavioral control has a highly significant relationship with gender for solid waste source separation intention at a 1% ($p = 0.000$) level of significance. It emphasized that the women are handling the domestic work rather than men, separating their waste to disposal in the Sri Lankan context, then, marital status is another significant factor, having reported a significant relationship ($p = 0.046$) with this. Also, the age is marginally significant ($p = 0.072$) with perceived behavioral control. These results suggest that most mature and married women in Sri Lanka are more capable of solid waste source separation behavior of HH than men. Furthermore, the effect of additional DSECs exists in the separation process to make it effective and demonstrates how simple it is to exhibit their lives in an environmentally sensitive manner.

After discussing the results of the associations between DSECs and SSPFs, the Person Correlation analysis (r) in pairwise was used to find out the mutual relationships between situational and socio-psychological variables towards solid waste source separation behavior of households. The level of significance is set at 1% ($p=0.01$), in this context, there are three types of relationships that were found to have mutual relationships between SSPFs among situational factors, among socio-psychological factors, and between situational and socio-psychological variables. Table 13. shows the mutual relationships of SSPFs by indicating their pairwise correlations.

Table 13: Relationship between SSPFs of Respondents on SWSS

Settlement Area		Urban		Rural	
Variables	Relationshi	PCC (r)	P-value	PCC (r)	P-value
Knowledge and Inconvenience	1	-.072	.333	-.154*	.016
Knowledge and Experience		.362**	.000	.504**	.000
Knowledge and Awareness		.340**	.000	.185**	.004
Inconvenience and Experience		-.098	.189	-.162*	.011
Inconvenience and Awareness		-.028	.711	.092	.152
Experience and Awareness		.289**	.000	.282**	.000
Attitudes and Subjective Norm	2	.092	.217	.115	.073
Attitudes and Perceived Behavioral Control		.468**	.000	.387**	.000
Subjective Norms and Perceived Behavioral Control		.122	.102	.269**	.000
Knowledge and Attitudes	3	.538**	.000	.516**	.000
Knowledge and Subjective Norm		.136	.068	-.031	.629
Knowledge and Perceived Behavioral Control		.279**	.000	.225**	.000
Inconvenience and Attitudes		-.084	.261	-.118	.065
Inconvenience and Subjective Norm		-.037	.622	.157*	.014
Inconvenience and Perceived Behavioral Control		-.180*	.015	-.033	.608
Experience and Attitudes		.388**	.000	.388**	.000
Experience and Subjective Norm		.197**	.008	.010	.877
Experience and Perceived Behavioral Control		.297**	.000	.321**	.000
Awareness and Attitudes		.187*	.011	.037	.562
Awareness and Subjective Norm		.155*	.037	.194**	.002
Awareness and Perceived Behavioral Control		.161*	.030	.067	.294

Source: Constructed by the researcher

1% - *, 5% - ** level of significance

In PCC - Pearson's Correlation Coefficient

1 - Among situational variables

2 - Among socio-psychological variables

3 - Between situational and socio-psychological variables

Firstly, the mutual relationships among situational factors were found. There are six pairwise mutual relationships which were calculated for both urban and rural sectors. The results identified a highly significant relationship between knowledge and experience ($p = 0.000$) with a positive correlation coefficient ($r = 0.362$) in the urban sector. Also, there is a highly significant relationship

between knowledge and experience (p = 0.000) with a positive correlation coefficient (r = 0.504) in the rural sector. The relationship between knowledge and awareness was highly significant (p = 0.000, p = 0.004) with positive correlation coefficients (r = 340, r = 185) in both urban and rural sectors. Likewise, the results identified a highly significant relationship (p = 0.000) between experience and awareness with positive correlation coefficients (r = 289, r = 0.282) for both urban and rural sectors. However, the results indicated a significant relationship between knowledge and inconvenience (p = 0.016) with a negative correlation coefficient (r = -0.154) in only the rural sector. Also, there is a significant relationship (p = 0.011) between inconvenience and experience with a negative correlation coefficient (r = -0.162) in the rural sector. Other mutual relationships among situational factors in both urban and rural sectors (knowledge and inconvenience, inconvenience and experience for urban sector, inconvenience and awareness for both urban and rural sector) were found to be insignificant among situational factors for SWSS.

Secondly, mutual relationships among socio-psychological variables were found. There are three pairwise mutual relationships which were calculated for both urban and rural sectors The results identified a highly significant relationship between attitude and perceived behavioral control (p = 0.000) with a positive correlation coefficient (r = 0.468) in the urban sector. Then, a highly significant relationship exists between attitude and perceived behavioral control (p = 0.000) with a positive correlation coefficient (r = 0.387) in the rural sector. Also, the relationship between subjective norm and perceived behavioral control was highly significant (p = 0.000) with a positive correlation coefficient (r = 269) in the rural sector. However, the results indicated an insignificant relationship between attitude and subjective norms in both urban and rural sectors. Also, the results indicated an insignificant relationship between subjective norms and perceived behavioral contro1 in the urban sector.

Finally, the mutual relationships between situational factors and socio-psychological factors were found. There are 12 pairwise mutual relationships which were calculated for both urban and rural sectors The results identified the highly significant relationships between knowledge and attitude, knowledge and perceived behavioral control, experience and attitude, and experience and perceived behavioral control (p = 0.000) with the positive correlation coefficient in both urban and rural sector (r = 0.538, r = 0.516; r = 0.279, r = 0.225; r = 0.388,r = 0.388; and r = 0.297, r = 0.321). Also, there is

a highly significant relationship between experience and subjective norm (p = 0.008) with a positive correlation coefficient (r = 0.197) in the urban sector. Also, the relationship between awareness and the subjective norm was highly significant (p = 0.002) with a positive correlation coefficient (r = 0.194) in the rural sector. In addition, the results identified the significant relationships between; inconvenience and perceived behavioral control, awareness and attitude, awareness and subjective norm, and awareness and perceived behavioral control (p=0.014, p = 0.015, p = 0.011, p = 0.037, p = 0.030) with positive correlation coefficients (r = -0.180, r = 0.187, r = 0.155, r = 0.161) for the urban sector and significant relationship (p = 0.014) between inconvenience and subjective norm is reported with a positive correlation coefficient (r = 157), for the rural sector. Other mutual relationships except the significant relationships reported between situational and socio-psychological factors in both urban and rural sectors (knowledge and subjective norm, inconvenience and attitudes, inconvenience, and subjective norm, inconvenience and perceived behavioral control, experience and subjective norm, awareness and attitude, and awareness and perceived behavioral control) were found to have no significant relationships between situational and socio-psychological factors for SWSS.

Finally, Pearson's pairwise correlation matrix revealed statistically high significant associations among situational factors, knowledge and experience, knowledge and awareness, and experience and awareness with a positive significant correlation for both urban and rural sectors. Also, the results revealed a high association (among socio-psychological factors) between attitudes and perceived behavioral control with a positive significant correlation for both urban and rural sectors. Also, there are statistically and highly significant associations between situational and psychological factors; knowledge and attitudes, knowledge and perceived behavioral control, experience and attitudes, and experience and perceived behavioral control with positive significant correlations for both urban and rural sectors. Among socio-psychological factors, the results revealed a highly significant association between subjective norms and perceived behavioral control with a positive significant correlation only for the rural sector. Also, there is a significant association between experience and subjective norms with a positive significant correlation, and there is a significant association between awareness and subjective norms with a positive significant correlation for

urban and rural sectors, respectively. Between situational and socio-psychological factors, there are statistically significant associations, awareness and attitudes, awareness and subjective norms, and awareness and perceived behavioral control with a positive significant correlation only for the urban sector. Further, there is a significant relationship between inconvenience and subjective norms with a positive significant correlation. However, there is a statistically significant association between inconvenience and perceived behavioral control with a negative significant correlation only for the urban sector. However, these associations proved that well-knowledgeable and experienced people were fully aware of quality living standards and perceptions. have the utmost intention of separating solid waste sources in the Sri Lankan context.

5. **Conclusion and Policy Implications**

This study delved into the relationship between Demographic, Socio-Economic Characteristics (DSECs), and Situational and Socio-Psychological Factors (SSPFs) concerning solid waste source separation behavior in both urban and rural households within the Sri Lankan context. The findings expanded on the work of Azmin et al. (2022) and highlighted moderately significant relationships between DSECs and SSPFs in the urban and rural sectors. The results underscored the importance of situational factors, such as knowledge, experience, inconvenience, and awareness, alongside socio-psychological factors like attitudes, subjective norms, and perceived behavioral control. Notably, positive significant correlations were evident among most situational and socio-psychological variables, indicating their impact on solid waste source separation behaviours.

The overall results of this study indicated that urban and rural residents with higher knowledge levels, better educational backgrounds, greater experience, heightened awareness, and reduced inconvenience displayed more favorable attitudes, subjective norms, and perceptions of improved living standards. These factors contributed to a stronger inclination towards solid waste source separation. Furthermore, the study revealed the interplay of various factors that contribute to wider mental integrity in promoting and sustaining solid waste source separation behavior in Sri Lanka's urban and rural areas. Local authorities' involvement was found to be vital in facilitating waste source separation practices, highlighting the significance of their contribution to effective societal waste management.

The findings of this study hold practical implications for local authorities and waste management organizations in Sri Lanka. It underscores the need for an integrated approach encompassing solid waste source separation and disposal behaviors, while considering demographic, socioeconomic, and local authority factors. The findings presented here can ultimately inform policymakers, governments, administrative units, international/national funding agencies, project-driven organizations, and other stakeholders in crafting sustainable development policies and strategies. By adopting a collaborative participatory approach, one can improve the effectiveness of solid waste source separation intentions among the population, contributing to the economic and social sustainability of the country.

6. Limitations and Future Research Agenda

There are several limitations that should be acknowledged. The study's focus on the Sri Lankan context surely limits the generalizability of the findings to other regions or countries with different socio-cultural, and economic backgrounds, institutional capabilities. Consequently, comparative analysis with countries sharing close socio-cultural, economic background, and institutional capabilities with Sri Lanka would enhance the robustness of the results. Moreover, replicating the research framework of this study in diverse settings would also enhance the robustness of the results. The study solely employed a quantitative approach, which may overlook qualitative insights and in-depth understanding of individual behaviors and motivations. Future studies could incorporate qualitative methods, such as interviews or focus groups, to gain richer insights into the factors influencing waste source separation behavior. Additionally, the sample size of 428 households did not fully represent the vast population of urban and rural households in Sri Lanka. Therefore, expanding the sample size would improve the study's statistical power and allow for better government policies and accurate awareness campaigns capable of influencing urban and rural households to engage in efficient solid waste source separation.

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