



# Distribution flow of used motorcycles exported from Japan

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## Abstract

This study focuses on used motorcycles (UMCs) that are exported from Japan, observes identifiable characteristics of each destination country's UMC exports, and categorizes their distribution flows. Based on the findings from precedent research, results from compiled data of trade statistics, and field surveys, this study reveals the following characteristics. (1) UMCs are continuously exported to the United Arab Emirates (UAE), but the export numbers fluctuate yearly. The UAE also exports large numbers of UMCs with low displacements and UMCs from all statistical categories except for “other.” (2) The number of UMCs exports to Cambodia has been increasing since 2011. In addition, changes in exports from 51 to 250 cc to low displacements of 50 cc and less are identified. Cambodia also exported UMCs from all statistical categories except “other.” (3) The number of UMCs exports to Myanmar has been increasing since 2015, and the primary units exported exhibit “electric motor propulsion as a motor driving force.” (4) Country trade features are identified and UAE is designated as a “transit trade type” and both Cambodia and Myanmar as “domestic distribution types.”

**Keywords** Used motorcycles · Exports · Distribution flows

## Introduction

This study aims to analyze the UMC flows exported out of Japan and further categorize the distribution flows to each destination country.

Some previous UMCs studies in Japan include Yoneyama and Matsumoto [1], Abe and Kimura [2], Kimura and Asazuma [3], and Kimura and Yamane [4]. While Hara [6] studied official data on motorcycles in Japan, specifically those purchased and sold domestically, Murakami et al. [7] studied overseas UMCs [5, 6].

Among these researchers, Abe and Kimura [2], Kimura and Asazuma [3], and Kimura and Yamane [4] identified export trends from trade statistics. Their studies utilized official data obtained from the Japan Automobile Manufacturers Association (JAMA), the National Federation of Mini Vehicle Associations, and the Japan Automobile Importers

Association (JAIA), and they were able to distinguish stock and flow UMCs by identifying characteristics of distribution flow and export trends [2–4].

Previous studies have not yet clarified the characteristics of destination countries. Therefore, this study seeks to identify the features of the relationship between UMC exports and their destinations and further categorize their distributional flows.

To compile the total and exported number of UMCs, this study used official data related to UMCs in Japan, including units owned and sold, as well as trade statistics. The export numbers data were further delineated by country of destination. Additionally, based on the prior research's handling of end-of-life “four-wheeled vehicles” in each destination country, this study seeks to clarify the specific handling of exported UMCs at each destination and categorize the distribution flow.

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## Materials and methods

### Used Motorcycles (UMCs) total and exported numbers

This section reveals that the majority of UMCs in Japan are exported. In this study, UMCs, synonymous with the “number of registered deletions” highlighted by Abe and Kimura [2], calculated with Eq. (1) [2].

$$\text{UMCs} = \text{Op} + \text{Rc} - \text{Oc} \quad (1)$$

Op: owned units at the end of the previous year. Rc: registered units at the period of the current year. Oc: owned units at the end of the current year.

In Eq. (1), the Op and Oc data for displacement volume from motorcycles of 50 cc or less and 51–125 cc were extracted from the current unit numbers on the base assessment date (excluding mini vehicles) in Table 21's Light Vehicle Tax (discount type) under the Municipal Taxation Status of the Ministry of Internal Affairs and Communications [7]. The Op and Oc data for displacement volumes of 126–250 cc and 251 cc and above were calculated from the number of light and small motorcycles units owned in yearly and monthly increments and extracted from the National Federation of Mini Vehicle Associations [8]. The Rc data were from the number of New-Registrations Sales found in the Statistics Database (DB) of the Japan Automobile Manufacturers Association (JAMA) [9]. New-Registrations Sales numbers from this DB represent the shipment volume for domestic retail dealers [10].

The calculated number of UMCs from Eq. (1) is comprised of (1) the number of exported UMCs, (2) the number of motorcycles collected from the voluntary-motorcycle

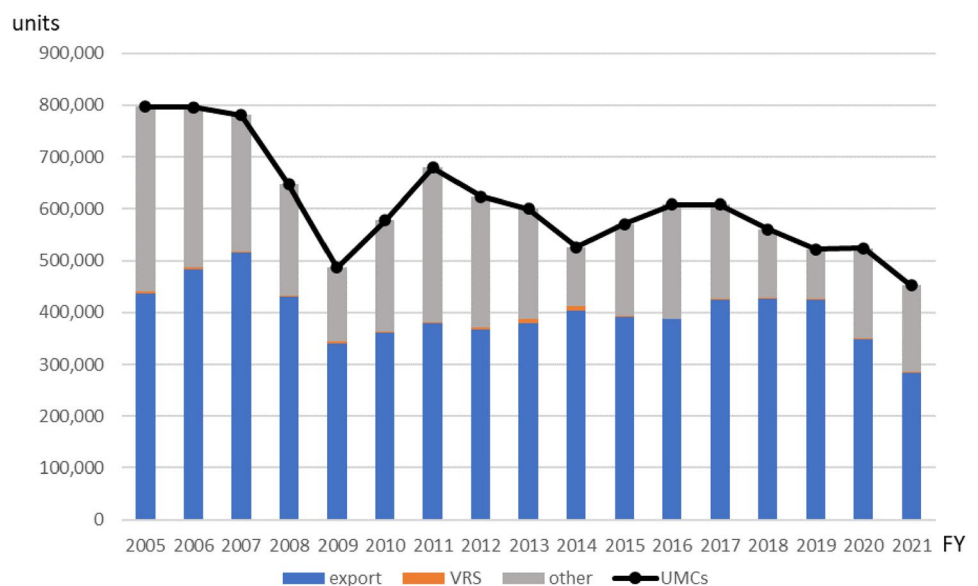
recycling system (VRS), and (3) the net increase in deregistered UMCs [2]. The number of exported UMCs can be aggregated from the Trade Statistics of the Japan Ministry of Finance for (1) [11]. The number of motorcycles collected in (2) from the VRS can be aggregated from the published data by the Japan Automobile Recycling Promotion Center (JARC) [12]. Since published data on the net increase in deregistered motorcycles does not exist, data collection is complex for (3) [2]. Although UMCs are compiled from different data sources, there is no difference in the way the data are compiled and analyzed.

Figure 1 indicates the number of UMCs calculated with Eq. (1) and a breakdown of the trends. As the polygonal line graph in Fig. 1 shows, registered UMCs declined from 796,681 in 2005 to 646,977 in 2008 and declined even more rapidly to 486,612 in 2009. This number increased to 577,445 in 2010, which fluctuated in the 500,000–600,000 s range. Thereafter it was observed to be 560,499 in 2018, 521,644 in 2019, 523,821 in 2020, and 451,707 in 2021.

This study further focused on the number of exports shown in Fig. 1. The number of exported UMCs in 2005 was 436,087, 482,693 in 2006, 514,565 in 2007, 429,755 in 2008, and fluctuated in the range of 300,000–400,000 s thereafter. In the last 5 years, this number changed to 424,868 in 2017, 426,438 in 2018, 424,372 in 2019, 347,720 in 2020, and 282,873 in 2021.

The percentage of exports within the number of UMCs was 54.7% in 2005, 60.6% in 2006, 65.9% in 2007, 66.4% in 2008, and fluctuated in the range of 50–80% thereafter. In the last five years, this percentage changed to 69.9% in 2017, 76.1% in 2018, 81.4% in 2019, 66.4% in 2020, and 62.6% in 2021. Consequently, the percentage of exports within the number of UMCs had a 50–80% range.

**Fig. 1** UMCs and exported units



### The number of exported units by statistical classification

As described above, the primary characteristic of UMCs distribution flow in Japan is a high percentage of exported units. What features exist by displacement volume?

According to the Road Transport Vehicle Act and the Enforcement Regulations of the Road Transport Vehicle Act in Japan, motorcycles are classified into four types. Motorcycles with an engine power delivering total displacements of 50 cc or less are *Class 1 Motorized Bicycles*, displacements above 50 cc but below 125 cc are *Class 2 Motorized Bicycles*, displacements above 125 cc but below 250 cc are *Light Motor Vehicles*, and displacements above 250 cc are *Small Motor Vehicles*.

However, motorcycle classifications in the Trade Statistics of the Japan Ministry of Finance differ from the above. It describes “HS Code 8711” as follows [11]:

Motorcycles (including mopeds) and cycles; fitted with auxiliary motors, with or without side-cars; side-cars.

Accordingly, this study compiled the number of exported units using the HS code 8711. Aggregated data were grouped as follows: – 50 cc (HS code 8711.10.910), 51–250 cc (8711.20.910), 251–500 cc (8711.30.910), 501–800 cc (8711.40.910), 801 cc—(8711.50.910), “motorcycles with electric motor for propulsion,” (8711.60.100) and “other” (8711.90.100) [2]. For ease of understanding, units are described in “cc” in this paper, and HS codes are omitted in the graphs to indicate the displacement categories. Since the HS code referencing the “motorcycles with electric motor for propulsion” category

was established in January 2017, data before this date did not exist.

Figure 2 describes the change in numbers of exported units by statistical classification from 2001 to 2021. Among the displacement categories, the highest percentage belonged to the – 50 cc group. In 2005, the – 50 cc category was 78.7% (343,152 units), and this percentage ranged at approximately 70% through 2013. However, this percentage declined to 68.4% (276,373 units) in 2014 and hovered around the 60% region after that. In 2021, the portion of the – 50 cc category was 58.6% (165,648 units).

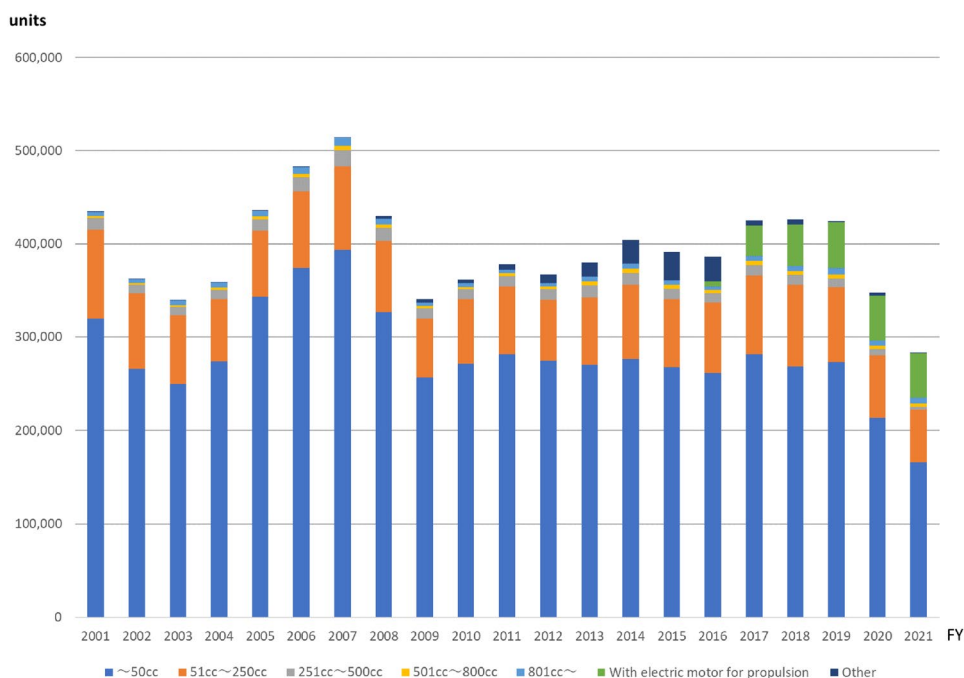
The second highest percentage among the categories was the 51–250 cc. In 2005, the percentage of 51–250 cc displacements category was 22.0% (95,364 units). This value changed to 22.3% (80,964 units) in 2012, and 21.5% (72,995 units) in 2013, remaining in the 20% range. Subsequently, the value declined to 18.5% (66,450 units) in 2014 but increased to 20.5% (87,300 units) in 2018. However, it declined to the 10% range thereafter resulting 18.8% (79,982 units) in 2019, 19.2% (66,690 units) in 2020, and 19.9% (56,419 units) in 2021.

The percentages of the remainder of the displacement categories (251–500 cc, 501–800 cc, and 801 cc and above) fluctuated in the range of 1–3%.

The proportion of UMCs in the “motorcycles with electric motor for propulsion” category is seen to be increasing, whereas those categorized as “other” have been declining every year [4].

The percentage of “motorcycles with electric motor for propulsion” was 1.4% (5560 units) in 2016, and this value increased to 7.7% (32,512 units) in 2017, 10.4% (44,401

Fig. 2 The change exported units by statistical classification



units) in 2018, 11.6% (49,283 units) in 2019, 13.8% (48,152 units) in 2020, and 16.9% (47,673 units) in 2021.

In the “other” category a declining trend is seen where the percentage was 6.9% (26,682 units) in 2016, 1.2% (5196 units) in 2017, 1.3% (5,596 units) in 2018, 0.3% (1092 units) in 2019, 1.0% (3370 units) in 2020, and 0.0% (1 unit) in 2021.

After requesting information from the Customs Organization within the Customs and Tariff Bureau of the Ministry of Finance, this study confirmed that specific types among the “motorcycles with electric motor for propulsion” that have been increasing every year are primarily electric motorcycles and electric bicycles (Authors called and inquired on June 29, 2022).

### The number of exported units by destination countries

This section identifies the UMCs destination countries. Table 1 indicates the top ten UMCs export countries in the last ten years. In 2012, the largest number of units were shipped to Russia (77,021 units). Among the top ten countries in 2012, eight countries, Russia, Ukraine, Cambodia, UAE, Nigeria, Hong Kong, the Dominican Republic, and Saudi Arabia, continued to rank in the top ten until 2021. Before they fell out of the categories, both Lebanon (until 2014) and Iraq (until 2020) had been ranked in the top ten.

One interesting observation from the past ten years has been the increase in UMC exports to Myanmar beginning in 2015. The number of Myanmar exports were 13,258 units (Ranked #9) in 2015, 30,248 units (Ranked #3) in 2016, 44,551 units (Ranked #3) in 2017, 51,711 units (Ranked #4) in 2018, 50,283 units (Ranked #3) in 2019, 53,355 units (Ranked #2), and 34,133 units (Ranked #3) in 2021.

### Primary factors that cause changes in distribution flow

Many prior studies on the destination countries of end-of-life vehicles have primarily focused on “four-wheeled vehicles.” These studies have revealed that politics and geographical conditions influenced the distribution flow.

The UAE is an example of a country where tariff measures influenced the distribution flow. The UAE is considered a transit trade country for end-of-life four-wheeled vehicles [13, 14]. This role is protected through bonded areas known as “free zones.” A significant number of these bonded areas are found in the UAE, including free zones sanctioned by the government (Dubai Auto Zone/DAZ, formerly known as Dubai Cars and Automotive Zone). The UAE’s import tariff is 5%, but goods to be re-exported are exempt from taxation. The UAE has developed as a transit trade country, and its primary re-exporting destinations are countries with

left-hand-side driving, such as Tanzania, Kenya, Uganda, Afghanistan, and Pakistan [15].

Myanmar is an example where government policies have resulted in changes in distribution flow. In September 2011, the government announced a scrap policy to reduce the environmental burden and ensure the safety of vehicles. With this policy, when a vehicle reaches a minimum of 20 years from the first year of its registration, a “scrap car certificate” is issued that enables any individual to privately import used vehicles that were brand-new models from 1996 to 2007. Moreover, this policy allowed importing right-hand-drive vehicles [16]. High-demand Japanese vehicles soon accounted for 90% of total imported vehicles [17].

Consequently, approximately 250,000 passenger cars were registered in 2011, which increased to around 460,000 in 2015. However, because traffic congestion became severe and traffic accidents increased, especially in urban areas such as Yangon, the government began to limit imports of right-hand drive vehicles in 2017. In 2018, right-hand drive vehicle imports, excluding heavy machinery, became prohibited [18].

Geographical borders also influence the distribution flow in Myanmar. Although importing right-hand drive vehicles are now prohibited, some importers take advantage of the close border to Thailand to smuggle right-hand drive vehicles. As a result, of the 110,000 scrapped vehicles between 2011 and 2018, approximately 97,000 units were unverified stocks. This number included smuggled units [16]. As this example shows, geographical location and imposing regulations occasionally result in smuggling.

## Results and discussion

### Target of observation

Considering the aforementioned statistical categories, data on the export destinations, and factors that cause distribution flow changes, this study determines the characteristics of the export destination and categorizes the distribution flow. This observation focuses on UMCs exported to three countries, the UAE, Cambodia, and Myanmar, selected from the top ten UMCs importing countries in the last 10 years, as shown in Table 1. Among the top countries, those that do not show characteristic variations in export trends by the displacement categories (e.g., Dominican Republic, Ukraine, Nigeria, Russia, Iraq, etc.) are excluded from this observation.

Reasons for choosing these three countries include: (1) the UAE and Cambodia have continuously ranked high in the number of exported units for the last ten years, (2) Myanmar drastically increased the number of exported units after 2015 and handled unique export items categorized as “motorcycles with electric motor for propulsion,”



(3) End-of-Life “four-wheeled motor vehicles” information was available from previous studies related to the UAE and Myanmar, and (4) authors already conducted field studies for Cambodia and Myanmar in 2018 and 2019.

### Characteristics according to export destinations

Figures 3, 4 and 5 indicate changes after 2001 in the number of exported units to the UAE, Cambodia, and Myanmar based on statistical classification. Table 2 shows the fraction of exported units by statistical category (the All countries, the UAE, Cambodia, and Myanmar). Figure 3 shows the yearly changes in the number of exported units

to the UAE, and many are – 50 cc category. This figure also shows that UMCs from other displacement categories were exported to the UAE. Table 2 shows the same. Comparing “the All” and “the UAE” for – 50 cc UMCs from 2001 in Table 2, we see that “the All” percentage was 74% while the UAE was 83%. In 2021, these figures were 59% and 75%, respectively. Moreover, UMCs in all displacements categories, except for “other,” were exported in 2001 and 2021. In other words, there are no “other” exports in both 2001 and 2021.

Therefore, the exports to the UAE are continuous (despite the number of units fluctuating by year), have a high proportion in the volume of low displacement

Fig. 3 Export units to the UAE

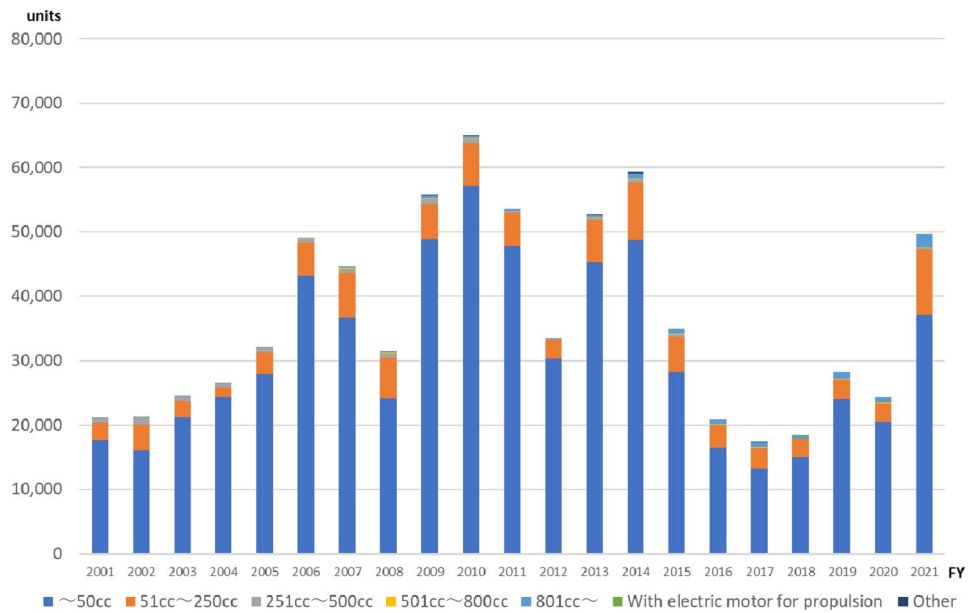
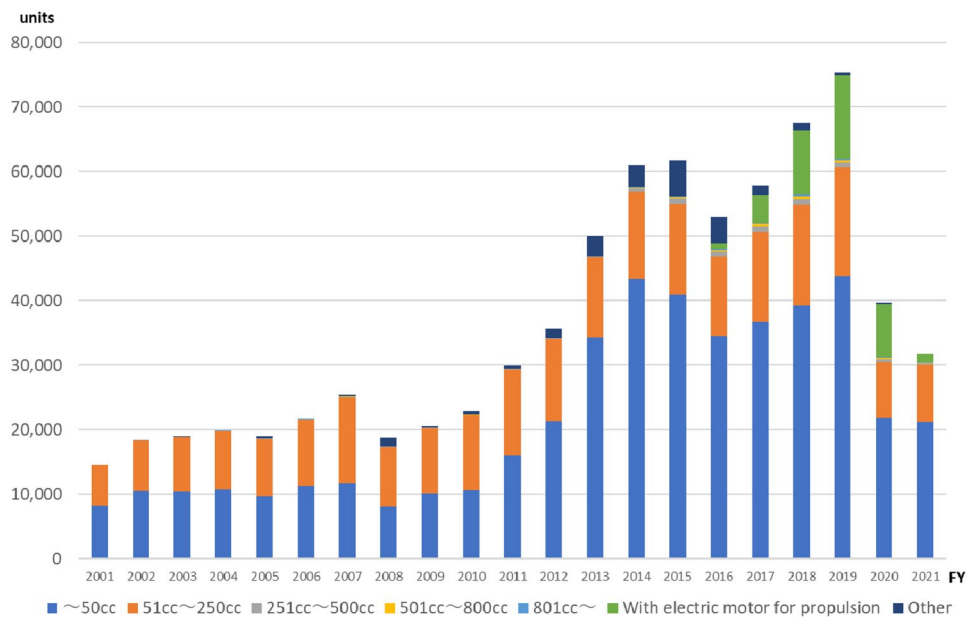
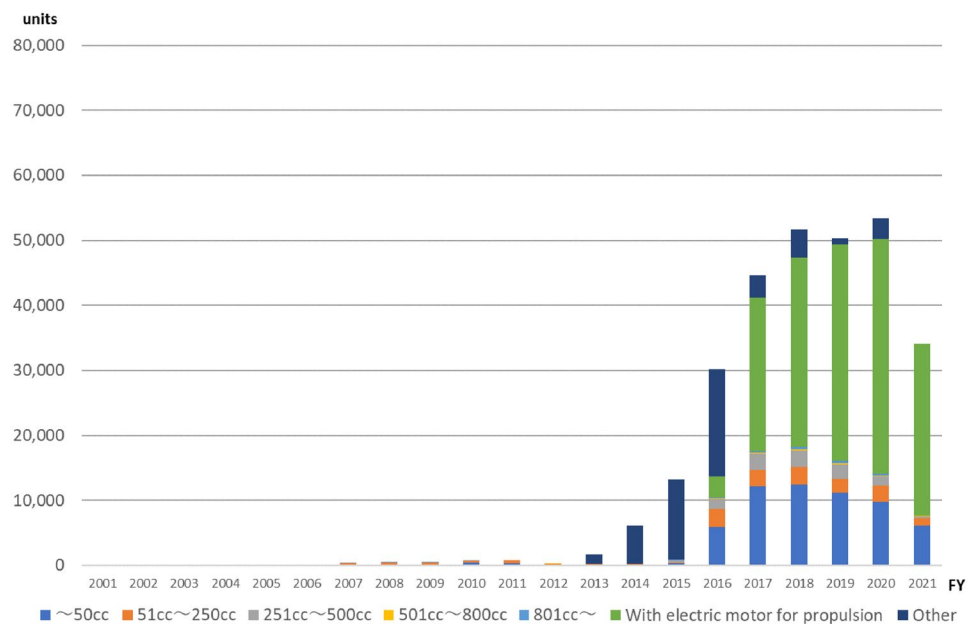


Fig. 4 Export units to Cambodia





**Fig. 5** Export units to Myanmar

exports, and export units from all displacement categories except those that fall under “other.”

Figure 4 shows the number of export units to Cambodia has been increasing since 2011, and units from all displacement categories except “other” were exported in 2021. Table 2 also confirms these characteristics. Table 2 compares “the All” with Cambodia for – 50 cc and 51–250 cc in 2001 and 2021. In 2001, the total was 74% for – 50 cc and 22% for 51–250 cc while Cambodia was 57% for – 50 cc and 43% for 51–250 cc. In 2021, the all was 59% for – 50 cc and 20% for 51–250 cc while Cambodia was 67% for – 50 cc and 28% for 51–250 cc. Consequently, exported units in 2001 were primarily the 51–250 cc displacements category but changed to – 50 cc in 2021. Also, the number of “motorcycles with electric motor for propulsion” increased in 2021, and units from all categories except “other” were exported.

Therefore, exports to Cambodia include the increase of exported unit numbers after 2011, a notable change in trend from 51 to 250 cc to low displacement volumes of – 50 cc, and export units from all categories except “other.”

Figure 5 shows the gradual increase of the number of units exported to Myanmar after 2013 and the rapid growth after 2015, as well as the large number of those units that were “motorcycles with electric motor for propulsion.” Table 2 shows this high percentage to be 78% (26,470 units) in 2021.

Therefore, exports to Myanmar include the rapid increase of exported unit numbers after 2015, and “motorcycles with electric motor for propulsion” were the primary exported units.

### Categorizing distribution flow

According to previous studies of “export countries of four-wheeled motor vehicles” for end-of-life motor vehicles, the UAE acts as a transit trade country. At the same time, Myanmar contains an unverifiable distribution flow due to its geographical border location and imposed regulations. What characteristics exist in the UMCs distribution flow? This study determined and categorized the distribution flow of UMCs into “transit trade type” and “domestic flow type.”

First, categorizing the UAE distribution flow is complex and requires an additional field study. However, since previous studies confirmed that the transit-trade areas are operated in the free zone for four-wheeled motor vehicles, this study anticipates the same result for UMCs. Exports to the UAE have been continuous with no bias in statistical classification. Units from all categories except “other” are exported. Therefore, this study categorizes the UAE export as a “transit trade type,” although a field study is still necessary.

Second, we conducted field studies in Cambodia in 2018 and 2019 and obtained the following information from several interviews. Photo 1 shows Store X, one of the imported used motorcycle dealers, located near “The Olympic Market” in Phnom Penh. During the field study in 2019, where surveys were given to three imported used motorcycle dealers and two imported used motorcycle repair dealers, the owner of Store X provided the authors with the following information:

“I have been importing used motorcycles from Japan for 20 years. In the past, I re-exported them to Vietnam, but now they are only sold domestically. The num-

**Table 2** Export volume by destination and statistical category

	All		UAE		Cambodia		Myanmar			
	2001FY	2021FY	2001FY	2021FY	2001FY	2021FY	2001FY	2021FY		
	Units	%	Units	%	Units	%	Units	%		
~50 cc	319,743	74%	17,646	83%	82,48	57%	0	0%	6151	18%
51–250 cc	95,364	22%	2786	13%	6259	43%	6	100%	1136	3%
251–500 cc	12,505	3%	682	3%	0	0%	0	0%	288	1%
501–800 cc	2472	1%	3723	1%	0	0%	0	0%	33	0%
801cc~	4271	1%	6050	2%	0	0%	0	0%	55	0%
With electric motor for propulsion	NA	NA	NA	NA	NA	NA	NA	NA	26,470	78%
Other	41	0%	1	0%	0	0%	0	0%	0	0%
Total	434,396	100%	282,873	100%	14,507	100%	6	100%	34,133	100%



**Photo 1** Store X. This Photo shows Store X, one of the imported used motorcycle dealers, located near “The Olympic Market” in Phnom Penh. (Photo by the author, December 10, 2019)

ber of imported units from Japan has been declining because the popularity and demand for new motorcycles made in Thailand have increased. In this area, only 20–30 dealers that handled motorcycles existed twenty years ago, but now these numbers have increased to 100–200. The import volume of 10 containers a month from Japan in the past had been reduced to one or two containers a month in recent years. Motorcycles in good condition are sold as is. Those that need repairs, I fix and sell. My Japanese agents buy them in Japan and ship them to my company. My company doesn’t handle used parts. No used car auction sites exist in this city. Used motorcycles are mainly sold domestically. Usually, Cambodian dealers purchase five to ten motorcycles at a time (the numbers are usually small). Because my company has been in business for a long time, the sales volume is fairly large in this area. However, profit is declining. We must consider changing to other businesses.” (The authors conducted the interview on December 10, 2019)

Although research by interviews has limitations, imported used motorcycles in Cambodia are most likely distributed domestically. Therefore, this study categorizes Cambodia’s exports as the “domestic flow type.”

Third, we conducted field studies in Mandalay, Myanmar, in 2019 and obtained the following information from several interviews. Photo 2 shows Store Y, a used motorcycle dealer located near the University of Mandalay in Mandalay City. During the field study, where surveys were given to one imported used motorcycle dealer and two used automobile dealers, the owner of Store Y, provided the authors with the following information:





**Photo 2** Store Y. This Photo shows Store Y, a used motorcycle dealer located near the University of Mandalay in Mandalay City. (Photo by the author, August 28, 2019)

“In our store, we sell motorcycles that are made in Thailand and Vietnam. We don’t buy stolen motorcycles. We buy them as long as they are registered in Myanmar. However, we are not able to verify if the motorcycles we bought were imported illegally from Thailand. We usually sell approximately 50 motorcycles a month locally and occasionally to outside of the Mandalay region. Japanese used motorcycles have become less available due to their high price. Also, we can only import used motorcycles manufactured after 2015 from Thailand.” (The authors conducted this interview on August 28, 2019.)

Despite the limitation of research by interviews, imported used motorcycles in Myanmar are most likely distributed domestically. This field study could not confirm the presence of “motorcycles with electric motor for propulsion.” Thus, further research is required. This study categorizes Myanmar’s exports as the “domestic flow type.”

## Conclusion

The results of this study clarified specific characteristics of UMCs for each destination country as follows:

UAE exports are continuous despite the annually fluctuating numbers of units. Lower displacement volume UMCs form a higher percentage of the country’s exports, and units from all displacement categories except “other” are exported.

Characteristics of Cambodia exports include the increase of exported unit numbers after 2011, an observation

showing a trending change from 51 to 250 cc to low displacement volumes of – 50 cc, and units from all categories except “other” are exported.

Another feature of Myanmar exports includes the notable increase in imported units after 2015, with the “motorcycles with electric motor for propulsion” category making up the direct proportion of exported units.

This study’s results designated the distribution flow as follows:

UAE exports are considered as the “transit trade type.”  
Cambodian exports are considered as the “domestic distribution flow type.”

Myanmar’s exports are considered as the “domestic distribution flow type.”

The conclusions of this study are based on data available in Japan related to used motorcycle exports, previous studies, and field surveys. Therefore, the limitations of this study are that the destination is not necessarily the place of consumption, that domestic use is assumed even in the transit trade type, and that the presence or absence of re-exports by trade statistics has not been confirmed for Cambodia and Myanmar, since the study was mainly based on field surveys.

This study requires further research. First, a field study in the UAE is necessary to verify its category of distribution flow. Second, the destinations that continued from 2001 to 2021 include Ukraine, Nigeria, and Russia. For these three regions and top countries, we will identify the characteristics of the destinations. Last, we will characterize motorcycle exports in comparison to automobile destinations.

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**Data availability** The data that support the findings of this study are openly available in Refs. [7–12].

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