

## **Characterizing The Role Of Non-motorized Transportation: The Logistics System In Baguio City Public Market Through Human Powered Carts**

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**Abstract:** The act of recognizing Non-Motorized Transport (NMT) system has a valuable role in the developing world for it gives substantial contributions to the links of economic, environmental, cultural, health and social aspects in sustaining the mobility needs of people. In urban areas, non-motorized vehicles (NMVs) are not only relevant for the movement of people, but also for the transport of goods. Conclusive evidence is through the case of human powered carts as a research study enabling to determine its efficiency and more of its function that are to be characterized. Logistics chain or system is to be studied as to identify the source and the key of consumption in order to meet people's criteria. This can be done either by the seller or by an entrepreneur as a service condition for the customer.

*Key words:* Non-motorized Transport, Non-motorized Vehicles, Logistics

### **1. BACKGROUND OF THE STUDY**

Over the past decades, Baguio was a newly established township in the Northern Luzon Highlands. The Baguio City Public Market then served a small, multi-cultural community. Based on the 2010 census, Baguio City is composed of over 300,000 residents. With increasing number of population, the needs of resources of consumers are felt most at the public market. Insufficient spaces are caused by steadily growing number of vendors and market-goers. In the year 1930s, Baguio City Public Market was formerly called Stone Market. It was considered as one of the most historically important buildings. The market fire in 1970 and the subsequent demolition of the Stone Market had entered into an agreement of the city government with a private corporation to renovate, reconstruct, and modernize the Stone Market. The market undergone several cases of fire, but then, together with the city officials, engineers, vendors' associations and concerned individuals, they made important decisions on the future of Baguio City public market. Areas to be studied by the researchers are Kayang-Hilltop section, Hangar Market, and Rice Section. These specific areas will serve as a means of observing the operation involving the use of human powered carts.

Council of Logistics Management (1991) defined that logistics is 'part of the supply chain process that plans, implements, and controls the efficient, effective forward and reverse flow and storage of goods, services, and related information between the point of origin and the point of consumption in order to meet customers' requirements. Johnson and Wood's definition (cited in Tilanus, 1997). The probable origin of the term is the Greek *logistikos*, meaning 'skilled in calculating'. Logistics system includes physical activities and non-

physical activities. The role that transportation plays in logistics system is carrying goods for the entrepreneurs. Through an organized transport system, goods could be sent to the right place at right time in order to satisfy consumers' demands. It builds a bridge between entrepreneurs and consumers. Therefore, transportation is the foundation of efficiency and economy in business logistics and extends other roles of logistics system. Indeed, a good mode of transport upon the performance of logistics brings advantage not only to service quality but also to market competitiveness.

The researchers have formulated a study to further analyze the logistics system, specifically, within the Baguio City Public Market.

Over the last few decades, one of the popular means of transporting goods in the Philippines is the *kariton*. It was considered as an insignia of Philippine culture. Earlier than 1945, *kariton* was not only used for transporting goods but also as a mode of transportation of people from place to place. After World War II, it was called "karison" and was pulled by an Ox. It was described to have two big wheels with similar configurations as the present *kariton*. "Karison" pertaining to the previous name of *kariton*. It was used in the lowlands to trade their products in the city when Baguio is still rebuilding its pillars. Later, it was adopted in urban areas. The central trading post was in Hangar market and was transferred to Rabbit Bus Station. Then, it was relocated back to Hangar Market where "Hangar Market Baggage Carriers Association (HaMaBaCaAs)" was founded by the people who are using the *kariton*. This organization was established to regulate the growing number of *kariton* and to legalize the operation within the Baguio City Public Market. Due to the trend of globalization and nationalization in the past decades, the presence of other modes of transportation in the case of logistics was introduced. The number of *kariton* in Baguio City Public Market was more than hundreds and was depreciated after some number of years.

The researchers would like to characterize the role of *kariton*, as to familiarize, analyze, and generalize its distinctive attributes in order to compare it with other Asian countries through the operation of logistics.

## **2. OBJECTIVES OF THE STUDY**

The objectives of this study are the following:

1. To be able to determine the efficiency of the use of *kariton* in transporting goods within the Baguio City Public Market.
2. To compare the performance characteristics and relative cost of *kariton* with some intermediate means of transportation in other Asian countries.
3. To be able to determine the possible routes within the study area.
4. To be able to distinguish whether it is capital-intensive or labor-intensive.
5. To be able to determine the operational characteristics of *kariton* (schedule flexibility, ease of access, service frequency, dominant trip length, etc.)
6. To be able to establish the general configuration of the *kariton* (design, weight, life span., profile, etc.)

## **3. SCOPE AND LIMITATIONS OF THE STUDY**

The research will focus only on characterizing the role of *kariton* in the Baguio City Public Market. Coverage of the primary data would tackle on the performance characteristics, operational characteristics and assessment of the vehicle configurations. Also, the study is

limited on perception and preference of the consumers and the entrepreneurs of the market. The target study area was selected on the basis of focusing only in one area to concentrate on the information gathered and its nearness from the school where the researchers are studying. Consequently, Baguio City Public Market accounts to its relative vicinity for being a central trading post in Baguio City.

#### **4. SIGNIFICANCE OF THE STUDY**

Kariton plays a vital role in the logistics systems as it provides the potential of moving goods from one place to another at a specified location of transfer. In context of local cities, kariton may be adapted by other places in the local industry as it provides the efficiency in transferring goods especially in markets. Indeed, the significant role that the kariton plays is that it benefit almost everyone since lower-income and transportation-disadvantaged people often rely from non-motorized transportation. Kariton may be considered as an integral element of urban mobility although its role and significance vary by one place and by other countries. Thus, its development is a key element in sustainable and clean urban mobility. The expected output of the research is to provide the vehicle operating characteristics, income generating potential, its performance characteristics and relative cost to be able to compare its strengths, advantages and/or benefits among Asian countries who are using non-motorized transport in the case of logistics. These are to be provided to determine the background on the trip information and the potential of these modes as a transport in the case of transferring of goods. The researchers will also provide an inventory on the actual count of these modes in the specific categories inside the study area. This is significant so as to control the proliferation of these modes and to note the legal and illegal workers of *kariton* around the community.

#### **5. REVIEW OF RELATED LITERATURE**

##### **5.1. Non-Motorized Transportation (NMT) Systems**

Non-motorized transport (NMT), also called “Active Transport”, essentially refers to walking, cycling and all other modes that have wheels but no engine such as carts, pedicabs and freight tricycles. Non-motorized transport (NMT) consists of all non-motorized vehicles (NMVs) pedestrians. Non-motorized vehicle shall mean any trailer or any other device that is not self-propelled. In Asia, NMVs take several forms such as bicycles, bicycle rickshaws, animal carts and human powered carts. These NMVs together with bicycles and pedestrians form the backbone of the urban transport systems in Asia. These modes have been greatly promoted recently due to their great benefits for reducing transport emissions and for improved human health. Nowadays, it is not enough only to deliver the product at the right time to the right place. Human Powered Carts generate no air pollution, no greenhouse gasses and little noise pollution. It reduces emissions and noise that are critical to global warming. It reduces carbon dioxide, nitrogen oxides, and ground level ozone. These emissions are growing rapidly in most developing countries but if Non-motorized transportations are used these would be prevented.

## 5.2. Logistics System of Asian countries

### 5.2.1 Floating Markets in Thailand

Floating markets have been a famous tourist destination for more than 4 decades, with 25 well-known floating markets located in the center region of Thailand. The floating market is an authentic way of life of the Thai people who live near the river or canal and use boats as a traditional form of transportation. Thus, their boats are loaded with goods (mainly foods including fruits and vegetables) to trade in their communities at a specific time and meeting point. Tourists can observe these activities and buy local goods either by boat or at the shoreline, making this a favorable option for both domestic and international tourists. Kariton may somehow be adapted in this context as a means of transfer of goods from the market to the boats for vendors who are actually moving goods for business. As it has stated on the significance of the study, kariton varies its role to a place according to its purpose since kariton cannot be used by water.



Figure 1a



Figure 1b Source: google.com

Figure 1a and 1b. The Floating Market in Thailand used as a means of transport and selling of foods and other goods.

### 5.2.2 Rickshaw in Bangladesh

The continued significance of NMPT in many Asian cities is exemplified by Dhaka, Bangladesh, where despite strong growth in private vehicle ownership and policies generally negative to NMPT, there are an estimated 500,000 cycle rickshaws and rickshaws continue to be the dominant mode for non-walk trips. According to latest available figures of Strategic Transport Plan for Dhaka (STP) (2005), rickshaws have a 40% share of non-walk trips and continue to be crucial for the transport system of Dhaka. Rickshaws are the preferred mode for short trips (which predominate in Dhaka); and are the modal preference by significant social groups (women, elderly and office goers) because of their qualities of security, comfort and reliability. In addition, the rickshaw industry plays a major social function because of the huge workforce involvement; and has a growing role as a freight carrier. Rickshaws can operate on very narrow streets unsuitable for motorized vehicles; have reduced road space occupancy compared to private automobiles (Human Development Research Centre study 2004); are fuel-free with minimal environmental impact compared to motorized modes; and are an important source of employment for some of the poorest elements of the Dhaka community. NMPT currently plays a key role in the transport system and urban fabric in cities such as Dhaka and this role is expected to continue for some considerable time into the future.

The similarity that the kariton between the rickshaw depicts is that they can both transfer goods by means of human power. Its difference is that rickshaws can load people and goods while kariton may have a load of people but it is not its actual purpose.



Figure 2a



Figure 2b Source: google.com

Figure 2a and 2b. Rickshaw in Bangladesh as a mode of transportation of goods as well as pedestrians.

### 5.2.2.1 History of Rickshaw

Even today, NMPTs are a major mode of urban transport system in many developing cities of Asia. Becaks in major Indonesian cities, pedicabs in many cities in Philippines, samloris in most cities in Thailand and cyclos in Cambodia and Vietnam are examples of places in East Asia where NMPTs are plying as a significant public transport mode. Rickshaw is considered the main mode of transport in Bangladesh.

According to Gallagher (1992), Singapore was the first city to use cycle-rickshaws on a large scale. Calcutta's first cycle rickshaws appeared around 1930 (Warren 2003) and they soon spread to other towns in the hinterland. They reached what is now Bangladesh in the mid-1930's, and Dhaka by 1938(Rashid 1978). The cycle rickshaws of Dhaka had their present look by around the 1950's. Since then, the design, technology and operation of rickshaws in Dhaka have showed little change.

These rickshaws have one front wheel and two rear wheels, an average speed of 5 to 12 km/hr over distances of up to 40 km (Replogle 1991c) and capable of carrying two passengers in addition to the driver, or freight loads of up to 250 kg without a passenger (Replogle 1991c).

Rickshaws in Dhaka currently carry around 40% of non-walk trips and also have a major role as freight carriers for personal goods and small consignments. In addition, there are about 5,000 rickshaw vans that are used exclusively for freight carriage (STP 2005). Table 1 shows the modal shares of NMPT, public transport (bus) and private motorized transport over others in last few decades.

### 5.2.3 Indian Cycle Rickshaw

Another innovative way of increasing the use of non-motorized transport is to work with the human powered vehicle industry to modernize non-motorized vehicle technologies. While the bicycle is constantly being modernized by a dynamic and competitive industry, in many Asian countries bicycle rickshaws continue to be manufactured based on outmoded design developed in the 1950s. As a result, they are extremely heavy, slow, and uncomfortable, weighing around 80kg. Their outmoded designs make life hard for the low income operators. This has made it possible for politicians to ban the vehicles on supposedly humanitarian grounds. Unfortunately, banning the low income person, and forces people to walk long distances or use more expensive and polluting motorized vehicles.



Figure 3a



Figure 3b Source: google.com

Figure 3a and 3b. Indian Cycle Rickshaws

### 5.2.4 Pedicab

Pedicab or "Padyak" is another means of transportation in the Philippines. Pedicab is synonymous to cycle rickshaw, bikecab, cyclo, becak, trishaw and rickshaw which is generally refers to a human powered tricycle designed to carry passengers and goods. In Philippines some called it "Padyak" simply because it is powered by foot in the pedal. Pedicab is widely used throughout the world but most commonly used in South, East and Southeast Asia.

In Philippines, the design of pedicab is not far from the motorized tricycle, but the assembler usually choose lightweight materials like metal tubular for framing system and waterproof sheet fabric for cover. Since it is powered by human, no cost for diesel or gasoline, minimal maintenance, and low cost of investment, some are opt to consider this as their job. In Manila especially in Divisoria, it is already part of daily business. Some passengers choose pedicab because of its cheapest fare for transportation and for delivery of goods compared to tricycle, kuliglig or taxi. Kariton may be a substitute of pedicab in terms of moving goods and it can be considered an alternative and somehow more efficient since it can carry more payload.

Pedicab are best only in a flat terrain, this is the disadvantage compared to motorized vehicle with enough power to go up in hills. They are allowed on small streets, alleys, or even national roads depending on the local regulations regarding the use of pedicab as means of transportation.



Figure 4a



Figure 4b Source: google.com

Figure 4a and 4b. Pedicab of Philippines used for selling street foods and transporting pedestrians.

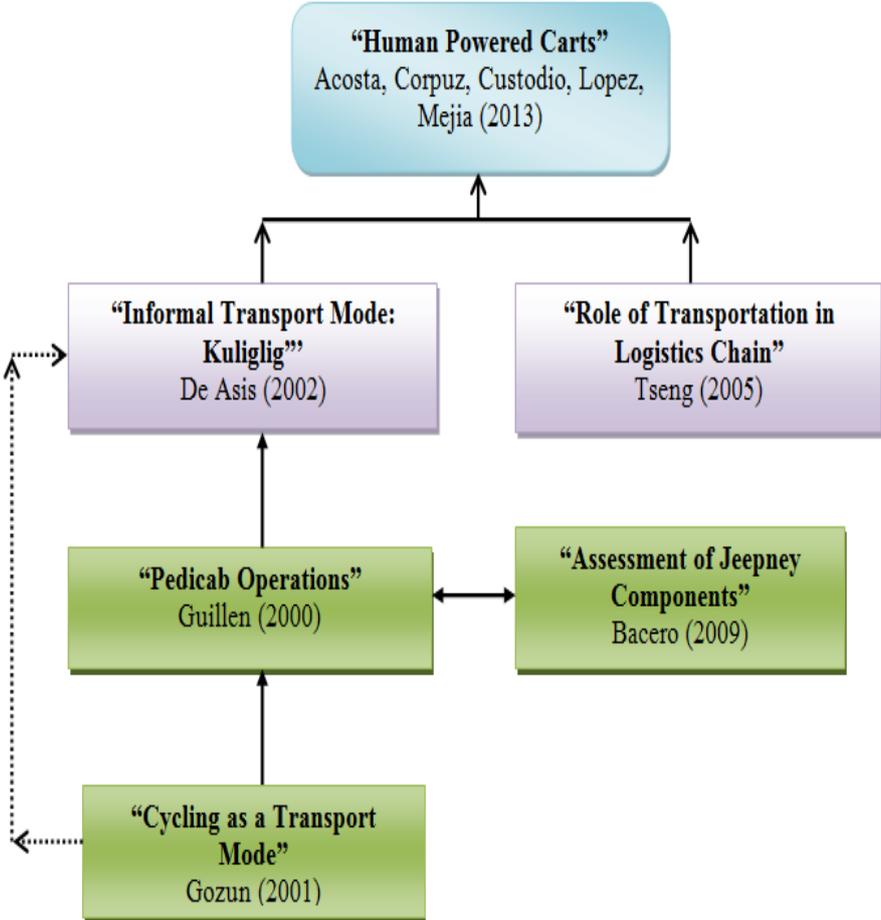


Figure 5. Text Graph of Past Studies

**6. FRAMEWORK OF THE STUDY**

Mobility, Accessibility and freight movement in a safe, economical and environmental-friendly mode of transportation is what sustainable transport system aims. In the context of the Philippines, Non-motorized transportations are popularly known. As to be specific, the researchers introduced the Logistics System which presents the valuable role of Human Powered Carts. Baguio City Public Market was chosen being the area of study.

The City Public Market vicinity comprises that property owned by the City of Baguio, which is more particularly bounded described as follows: bounded on the North by the hot cake and sari-sari extension sections, both sides of Hilltop Cut-off road coming from Magsaysay Avenue; on the South by Kayang and Abanao Street; on the east by Magsaysay Avenue; and on the west by Zandueta Street; and the tinapa section which is included within. The City Market has a total land area of about 3.25 hectares. The vicinity of the study is divided into three sections namely: Kayang – Hilltop, Rice Section, and Hangar Market. These sections are the route flexibility of the carts as to their specific road assignments in the transfer of goods.

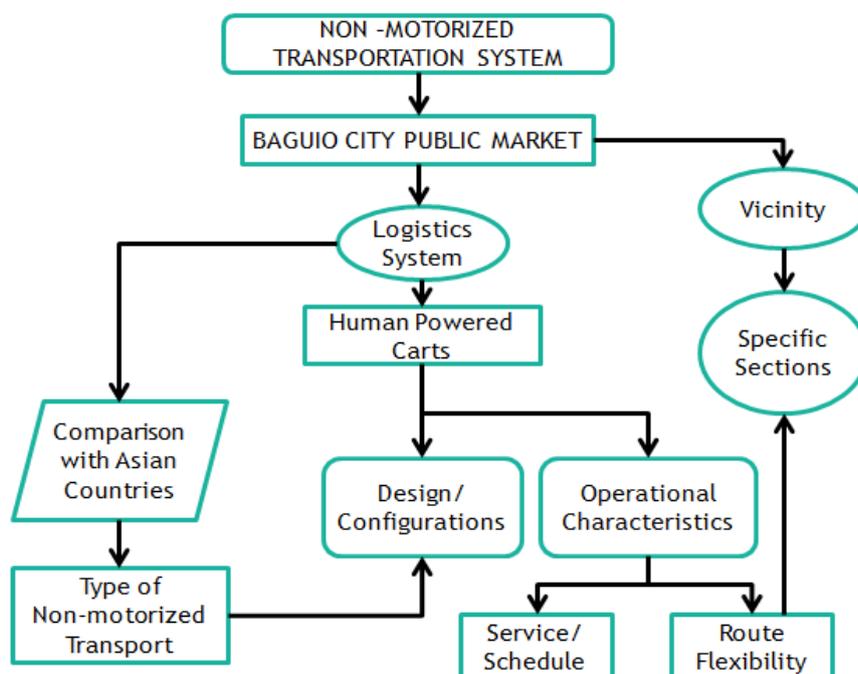


Figure 6. Framework of the Study

Human Powered Carts is to be characterized with its: 1) operational characteristics and 2) design/configurations. As to the operation and usage, the two important parameters are the schedule flexibility and route flexibility. And for its features, enumerated as follows: weight, maximum load, speed, range, terrain requirements and relative cost. These parameters are to be compared in the context of other non-motorized transport of other Asian countries in the case of Logistics.

## 7. DESIGN AND METHODS

This section of the research tackles how the results of the data gathered was obtained or generated and analyzed. It tells how the data was collected because often there are different methods that we can use in a research and the method used may affect the results of the research. It shows the consistency of the data collected or generated was with the accepted practice in the field of study. The research method was appropriate to the objectives of the study. The design and methods also discuss the problems that were anticipated and explain the steps taken to prevent them from occurring, and the problems that did occur and the ways their impact was minimized. A part of the methodology has insufficient information given to allow others to use the work or research. This is particularly for the case when a new method had been developed, or an innovative adaptation can be used.

In as much as this was called for an observation of the prevailing conditions and practices, the researchers made use of the descriptive method of research through the normative survey method, which included observations and interviews of officials in the area of study.

The operation of the public market is an exercise of functions of Local Government Units. Though, the main objectives of local officials in service, to some extent, funds as

necessary for its operations and for other socio-economic activities will ultimately benefit the people. Baguio City Public Market is divided to different zones:

Zone 1: rice section, old vegetable building, dry goods, tobacco, chicken section.

Zone 2: Sari-sari building, footwear, fish, meat, carinderia building, caldero section.

Zone 3: Hangar building, second hand section, tinapa, fruit around hangar, hot cake, refreshment, chichiria, flower section.

Zone 4: Hilltop market, access road block 3.

Zone 5: Slaughter house.

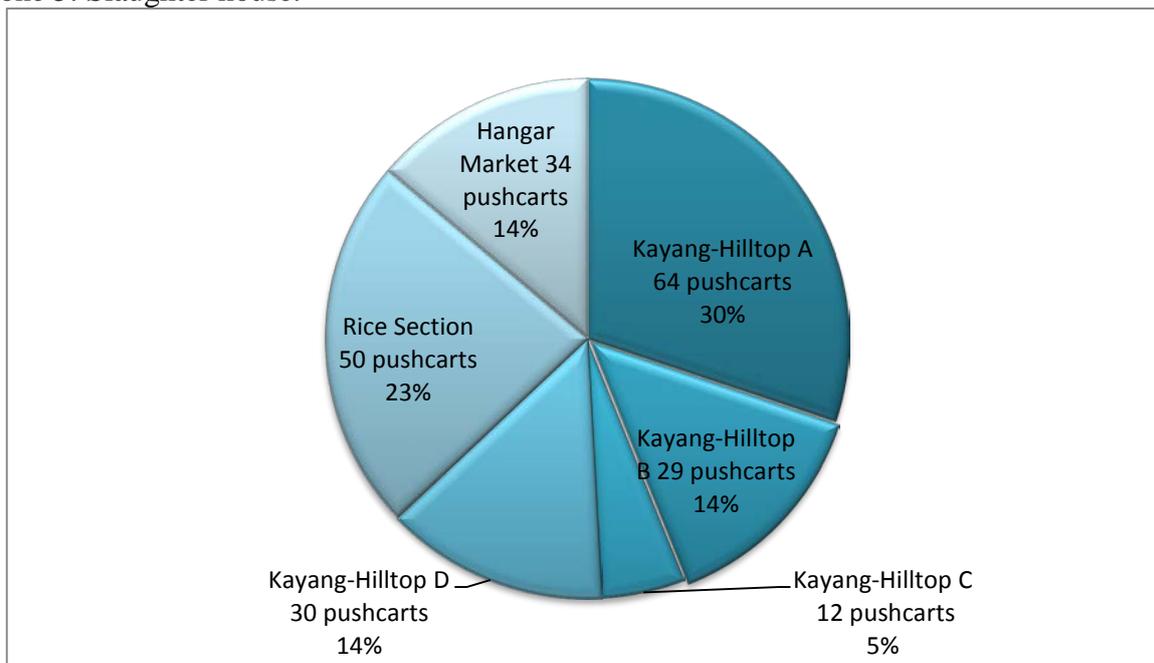


Figure 7. Percentages of Pushcarts

Baguio City Public Market (BCPM) is divided into six (6) sections – Hangar Market; Rice Section; Kayang-Hilltop A, Kayang-Hilltop B, Kayang-Hilltop C, and Kayang-Hilltop D. Everyday BCPM is generated with a total of about 218 plated pushcarts which are distributed among the six sections. Kayang Hilltop A has 64 pushcarts garnering the highest percentage of pushcarts in BCPM with 29% of the total percentage of pushcarts. This is due to the area where it accommodates more goods than the other five (5) areas of the BCPM. 50 pushcarts were generated into the Rice Section a 23% of the total percentage and the second highest area generated by pushcarts. It is because Rice Section is the area of the primary need of the people in Baguio City. Third in a row is the Hangar Market with 34 pushcarts generated and 16% of the total percentage. Next is the Kayang-Hilltop D with 30 pushcarts generated with 14% of the total percentage. Lastly, the area of Kayang-Hilltop C with 11 pushcarts generated and with 5% of the total percentage. The distribution of pushcarts was based on the area of the sections and the needs of the people of Baguio City.

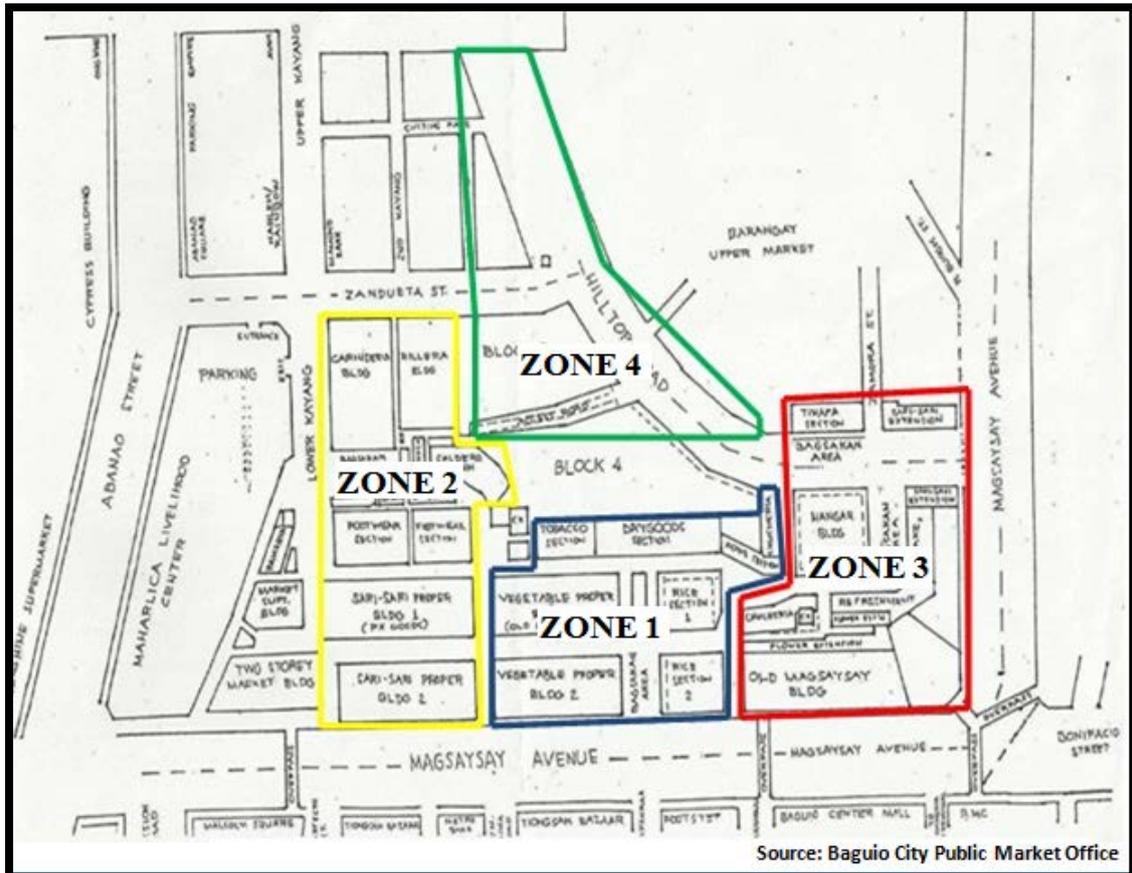


Figure 8. Vicinity Map of Baguio City Public Market

## 8. SURVEY AND DESIGN

The main products that are being delivered by *kariton* with corresponding charges are fruits and vegetables. Cost ranges from 5 to 30 pesos per plastic or sack depending on the weight of the product to be delivered. Most of the products come from the main station or “Bagsakan” and they are to be transported to the market stalls that are numbered accordingly and other nearby places. Rice is also one of the major products to be delivered, the charge is dependent to the distance traveled by the *kariton*. Cost from Bagsakan to Dangwa station is 30 pesos per cavan and the cost of transporting cavan of rice within the market vicinity is 10 pesos.



Figure 9a



Figure 9b



Figure 9c

Figure 9a, Figure 9b and Figure 9c.  
The Capacity of Human-Powered Cart

The figure shows the actual weighing of goods that the *kariton* will carry. The samples that were measured are sacks of rice that weighs 40-60 kg. The number of sacks that the *kariton* can carry depends on the capability of the convoys but the *kariton* can carry as much as 10- 15 sacks of rice. 15 sacks of rice that weighs 60kg added by other goods that weighs about 100kg will result to a sum of 1000kg being the maximum capacity of the human powered cart.

In order for convoys to be legalized, they must register to the City Public Market Office to start their operation. Registration fee is 500 pesos that will last for three years or depending on the rules of the officer-in-charge. Renewal is every three years and there is no tax to pay. Average income of convoys ranges from 200 to 300 pesos per day during ordinary days and 800 to 1500 pesos per day when schedules are given by the product bearer (biyaheros).

Table 1. Performance Characteristics and Relative Cost of Non-motorized Transportation In Asian Countries

Vehicle	Weight	Maximum Payload	Maximum Speed	Terrain/ Route Requirements	Relative Costs
<b>Cycle Rickshaw</b> (India)	80kg	175kg	10-15 kph	Flat, wide track	3500 Rupees (3000 PhP)
<b>Pedicabs</b> (Urdaneta City-Philippines)	85kg	220kg	---	Flat, wide track	6500 PhP
<b>Rickshaw</b> (Bangladesh)	92kg	250kg	5-12 kph	Flat, wide track	8000-12000 Taka (4600-7000 PhP)
<b>Long tail Boat</b> (Thailand)	20-25kg	350 kg	15kph	Stagnant River	50000THB (68000 PhP)
<b>Human Powered Carts</b> (Baguio City-Philippines)	80 kg	1000kg	2-5kph (within the market vicinity)	Flat, wide and/or narrow track	9500 - 10000 PhP

The table shows the performance characteristics (weight, load it can carry, speed and range) and relative costs of non- motorized transportation in other Asian countries. Philippines' human powered cart offers superior performance in terms of its storage capacity and range or distance it can travel within the Baguio City Public Market's vicinity, although it weighs twice or thrice as much as the Indian cycle rickshaw and Thailand's long tail boat. The *kariton* can be conveniently used in narrow tracks where vehicles cannot go through because of its unique configurations.

In terms of their relative costs, *kariton* may be costly but it can last long because of the materials used in its construction are rigid and durable.

### The Human Powered Cart Configuration

The unique configuration of Philippine *Kariton* features a simple and efficient medium of transport. Considering the location, slope and narrow streets of the Baguio City Public Market the use of *Kariton* is more preferred than the use of motorized transport. *Kariton* general configuration follows certain standards shown in the figure:

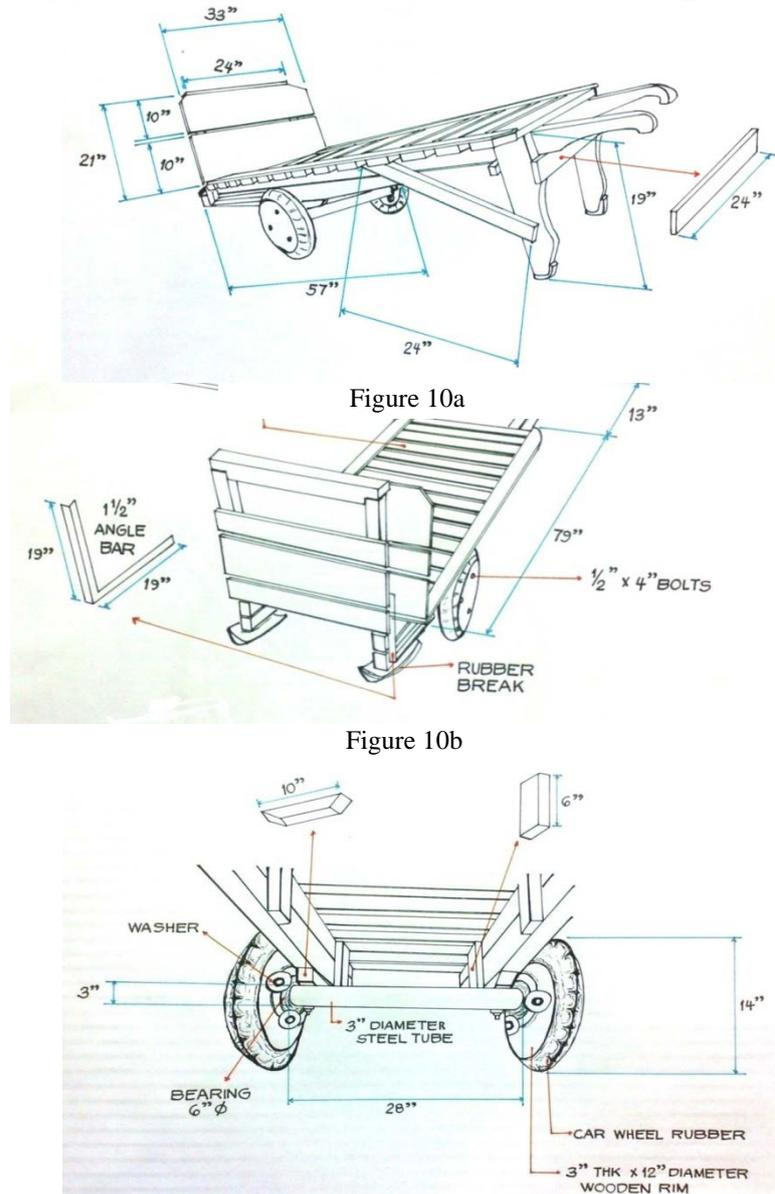


Figure 10c

Figure 10a, 10b, and 10c. The General Configuration of Human Powered Carts

After assessing the configuration of the *kariton*, like any other medium of transport in other places, it can be promoted or probably adopted to exercise its usage. There are advantages as the carriage that can accommodate more goods. The wheels have appropriate sizes; therefore it is easy to control. It has other accessories that would contribute to its efficiency, such as washers, bearings and rubber breaks. The *kariton* can be easily assembled because the materials are readily available in the market.

Upon the construction of the *kariton* in Baguio City Public Market is a group of people that are very skilled to meet the standard configuration. This is why there is uniformity on the *kariton* that is being used within the market.

Table 2. Bill of Materials and Cost Estimates

Quantity	Description	Size	Unit Cost	Total Cost
2 pcs	Angle Bar w/ Holes	1 ½ in x 29"	400	800
2 pcs	Bolts	12"	180	360
1 pc	Stand	2" x 2" x 8"	100	100
1 pc	Steel Tube	3" x 27"	350	350
2 pcs	Bearing	6" diameter	400	800
1 pc	Car Wheel Rubber		500	500
2 pcs	Wooden Rim	3" thick x 12" diameter	550	1,100
6 pcs	Wood flooring	1"x3"x12'	250	1500
3 kg	Common Nail	1½, 2, 2 ½ in.	80/ kg	240
18 pcs	Washer	3" diameter	10	180
2 pcs	Wooden Board	2" x 4"x12'	500	1000
2 pcs	Handle	2" x 3" x 8"	450	900
1 pc	Side Board	1" x 10" x 12'	780	780
1 pc	Welding		450	450
14 pcs	Knot	4"	6	84

Above table represents on how the materials of the *kariton* divided into highest cost to the lowest cost. Wood planks are the main material used for *kariton*. As for BCPM, wood planks are ready-use in our market but for the car wheel rubber, it is to be ordered. And as of the table, side boards and wooden rim are the most expensive as per unit cost. And as of total cost, one *kariton* costs around Php9,500-Php10,000, it vary because the labor cost changes.



Figure 11a



Figure 11b

Figure 11a and Figure 11b. The Actual Human-Powered Cart

## 8. CONCLUSION

The following can be concluded from the findings of the study:

1. The use of *kariton* maximizes the time of both the Convoy (the person who delivers the product with the aid of the *kariton*) and the Entrepreneur. Convoys making use of the *kariton* as an intermediate, easy access of transporting goods help the entrepreneurs to have their products at their place of delivery. This takes into account that *kariton* is an efficient mode in transporting goods instead of consuming more time and efforts exerted by kargadors. *Kariton* can carry a maximum capacity of 1000kg. Loads to be carry are primarily dependent on the capability of the “convoys”. The load to be carry is directly proportional to the effort to be exerted by the convoy.
2. One of the main concern of the study is to compare the characteristic of Philippine *kariton* to other mode of transport use in logistics in other countries. The comparison of characteristics is summarized in table 1. Philippine *kariton* can carry a maximum payload of 1000kg, Rickshaw in Bangladesh can carry a maximum payload capacity of 250kg while Indian Cycle rickshaw has the maximum payload of 175kg, and the Long Tail Boat in Thailand can carry a maximum payload of 350kg. Based on the tabulated data that have gathered through research and study, this implies that *kariton* can carry a greater capacity compared to other mode of transport used by other countries/places.
3. Based on the findings and discussions that the researchers have come up, it is therefore concluded that the research study is a capital-intensive method of production. Capital-intensive refers to the equipment that a business uses, which is the *kariton* that makes the service to be processed. The amount of capital needed to produce the service is measured in proportion to the degree of labor intensity which represents the labor cost.
4. The operational characteristics of *kariton* that the researchers have observed during the study period are: convoys are allowed to pick-up their products only to their assigned area, they have no particular time of work schedule, otherwise, schedules are permitted by *biyaheros*, they have no limit of capacity of goods to be carried as long as they can manage, they can only be subjected to a legal operation of *kariton* if they are officially registered.
5. The unique configuration of Philippine *Kariton* features a simple and efficient medium of transport in logistic. Considering the location, slope and narrow streets of the Baguio City Public Market the use of *Kariton* is more preferred than the use of motorized transport. The materials needed to the assembly of the *kariton* is enumerated and tabulated with the

breakdown of the cost estimate, this information was given by an expert *kariton*-maker, Renato Libao. Materials are being bought from hardware considering quality-wise.

## 9. RECOMMENDATIONS

On the basis of the stated findings and conclusions, the following recommendations are made:

1. A parking space for the *kariton* shall be provided within the Baguio City Public Market to lessen traffic congestion brought by the main distributors of goods and by the market-goers as well.
2. The *kariton's* registration plates shall be modified (letter and number combination) in order to lessen the number of *kariton* entering a specific zone where the goods are to be delivered and also to avoid having unregistered *kariton* plates.
3. Some improvements in materials must also be considered like changing heavy materials to materials that are light in weight. Although cost of material is a major concern in terms of economic analysis, the quality must be taken into account also for a longer life span of the *kariton* and a less effort of force exertion of the convoys. The quality or value of wood materials are lessened when the planks are soaked with water or neglected by moisture due to rain or goods that are wet, metals that are light in weight is a probable idea. Addition on the thickness of rubber to prevent worn out or damage to be use longer.
4. The routes outside market where *kariton* operates must have to be track to prevent this mode of transport to ply along major roadways.
5. The mechanical attributes of the *kariton* shall be improved. Because of the changing slopes within the market, it is recommended that *kariton* shall have hand brakes to prevent accidents.
6. Human-Powered Carts are recommended to be an alternative or an additional mode of transport to other places in terms of moving goods from one place to another. It is efficient by its attributes and it helps in the reduction of air pollutions and carbon foot-print reduction.

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