

DEMAND OF NEXT GENERATION BICYCLE FOR BICYCLE SHARING SYSTEM IN INDIAN MARKET

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ABSTRACT: In India, currently available cycles are designed for niche market which are focuses for particular gender their physical attributes and usage pattern, thus utilization of these cycle becomes limited. So to design a unique bicycle which will cover all age group people and with different height and ergonomic requirement, segments form street bicycles to sports-off road. Cycle have main features like Variable wheel base, Seat vertical movement, Seat longitudinal movement, Seat axial movement, Handle height adjustment, Handle longitudinal angle adjustment, Light weight (Aluminum), Variable Pedal Length. Cycle should be for all age group, Unisex. This paper is mainly focus on various aspects of India bicycle industry, comparison of Indian & international bicycle industry trends. This paper will help bicycle designer as forecasting reference for next generation bicycle requirement as per India bicycle consumer requirement.

Keywords: Limber bike, Indian bicycle industry, bicycle geometry, Bicycle sharing scheme, Indian market

I. INTRODUCTION

To understand the concepts of limber bike, its design and fabrication, we have to know about basics of Bicycle. Bicycle is a vehicle with two wheels held in a frame one behind the other, driven by pedals and directed with handlebars which are attached to the front wheel. It can be motorized cycle means motor powered, Pedal driven and human powered [3]. Today people are using bicycle for so many motives such as for general fitness purpose, in military, for an entertainment, bicycle stunts as personal hobbies, use as kid's toys, bicycle touring, mountain biking, Bicycle competition which includes racing, BMX racing, track racing, criterium, roller racing, sportive and time trials etc. German Baron Karl von Drais invented the first human transport to use only two wheels in a bike called as Dandy horse. There are mainly three types of bicycles: 1. Street 2. Off road 3. Dual purpose [5]. Today in India we have variety of cycles from simple version to the classy sporty one. We also have cycles with different lengths, heights and inclination and we have separate cycles for males, kids and ladies. Needs and wish of humans can change at any point of time and based on that one have to go for a new purchase every time [4]. To solve this problem limber bike is come up with unique feature which has the potential to bring renaissance in cycle industry. Limber means flexible which can convert into any type of model from standard, simple model. E.g. Sport bike.

II. GLOBAL BICYCLE INDUSTRY

Usefulness of bikes are depend on mainly three factors: 1. locality 2. Person's citizenship 3. Its financial growth. Bike sales are increased at spring and autumn seasons. The peak of selling is gradually high at that time in whole world [3]. Bicycle production is 100 million units per year in world wide. In 1990 and 2000, Compound Annual Growth rate is 0.94 percent. As china is called as kingdom of cycles, it manufactures highest cycles, as it manufactures 52 percent of bicycles in year 2000, then India produce 11 percent of bikes and Taiwan and japan manufactures 7 and 5 percent respectively. Europe, North America and japan produce 70 percent in worldwide [5].

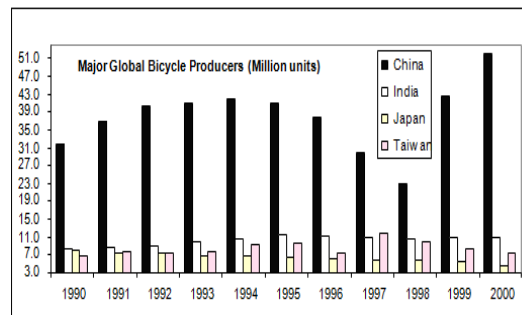


Fig.1 Major Bicycle producer country

III. BICYCLES PER PERSON IN COUNTRIES

Bicycle usage are varies in different countries. Netherland is called as country of cyclists as it has maximum number of cyclists. This city has 500 km of bicycle lanes and 50% of the peoples are commuting by cycles only. In Germany also Germans are used to prefer cycles for their regular travelling. In this country peoples has grown up by riding bicycle. In Japan bicycles are used to alternative option of motor car. Many of people use it to ride to the train station. Nowadays Japanese use bicycles for two reasons: 1. Fitness 2. To avoid traffic jams and crowded trains [5]. In United States 0.9 % of all trips are made by bike. Many Australian people enjoy cycling because it improves their health and reduces road congestion and air pollution. The government of Australia also start many campaigns and provide facility to encourage people for riding bicycles. In Shanghai (China) 60 % percent of the people use bicycle for their local work. Soth corea has best cycling lanes in Asia as it invested huge amount of money to built good lanes for cyclists. In India, approx. According to survey some figures are concluded that bicycle selling are more than car selling.

Country	Bicycles Per Person
Netherlands	.79
West Germany	.74
Japan ¹	.49
United States ¹	.42
Australia ¹	.42
China ¹	.27
Mexico	.16
South Korea	.15
India	.06
Malawi	.01

Table 1 The Indian bicycle at glance

IV INDIAN BICYCLE INDUSTRY

In India approximately 12 billion bicycle produced which cover all segment of bicycle users. In India in 2007 and 2008, Bikes are exported at worth 185 US dollar. This report is given by Engineering Exports Promotion Council. The market for the premium or the lifestyle bikes targeted towards the lifestyle consumer is just about intensifying [4]. The definition of high end bikes itself is changing. The country today is on the threshold of globalization and teaming million are looking for higher level of growth together with reasonable distribution of income to improve their lots. Indian manufacturers in the market are best suited to Indian conditions and are most economical and value for money products to satisfy the world' people need.

V. SEGMENTS WITHIN THE INDIAN BICYCLE INDUSTRY

The Indian bicycle market comprises two segments: "principles" and "specials". The specials or "fancy" segment comprises new generation bicycles, which are more expensive. Standards, which accounted for over 90% of the market in the early1990s today account for only 66% of cycle sales in the country [8]. New classes of bicycles called juveniles, which are categorized in the specials segment, have over-taken the standards. For rural and urban youth uses, juvenile has modified in urban look. In 1990 and year 2000, bicycles are sales are in double digit growth, its 12 percent. It happens because of high purchasing by government of Gujarat and andhrapradesh. This government project is of free distribution of cycles to people [10]. Full form of CAGR is Compound Annual Growth rate, full form of SLR is Sports Light Roadster and full form of MTB is Mountain Terrain Bikes.

The Indian bicycle industry at a glance:

	Size of Market (Mn. Units)	% of Total	CAGR 1996-97 to 2001-02	CAGR 1999-2000 to 2001-02
Standards	8.0	66.4%	2.7%	-2.4%
Specials:				
SLRs	0.5	4.4%	2.0%	-2.3%
MTBs	1.6	13.3%	22.4%	26.9%
Juveniles	1.1	9.5%	12.6%	2.2%
Kids	0.8	6.4%	15.5%	9.9%
Total Specials	4.0	33.6%	14.0%	12.5%
Grand Total	12.0	100.0%	5.8%	1.9%

Fig. 2 Bicycle per person in top most Country

VI. WHY BICYCLE SHARING SCHEMES IN INDIA

Over the past ten years, bicycle-sharing schemes have developed from being interesting experiments in urban mobility to mainstream public transport options in cities as large and complex as Paris and London [1]. Ten years ago, there were five schemes operating in five countries (Denmark, France, Germany, Italy and Portugal) with a total fleet of 4,000 bicycles (the largest was Copenhagen with 2,000 bicycles). Bicycle sharing schemes are carried out in 372 country where region of world people are using 235000 cycles. In India, Ludhiana is located in Punjab state, produced 25k bicycles/day [10]. In Ludhiana 1500 bicycle factories are located. They are manufacturing cycle and its different parts. They give employment to so many people. 213 cycle sharing scheme are operated in different 14 countries in 2008 year. They are using 73500 cycles. With the exemption of the system in Washington D.C., all systems were operating in Europe [15]. Within two years there has been a 76 per cent increase in the number of systems and the bicycle fleet has more than doubled. There are currently 375 bicycle-sharing schemes operating in 33 countries using 236,000 bicycles [3].

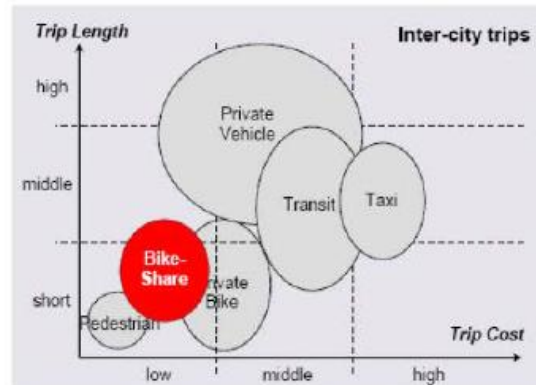


Fig.3 Role of Bicycle sharing system in urban mobility

Growth in bicycle -sharing schemes and fleet 2000-2010

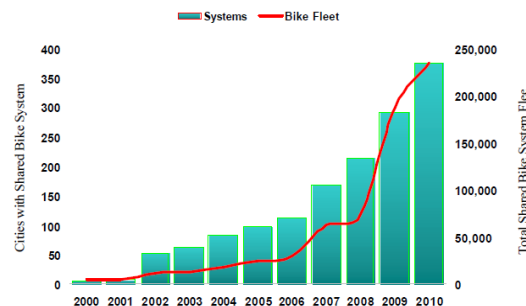


Fig.4 Bicycle Sharing System

a. Formulation

VII. DIFFERENT GESTURES OF BICYCLES



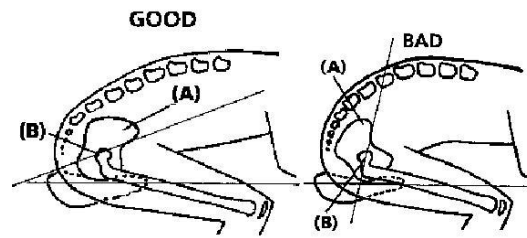


Fig. 5 Different Gesture of Bicycle

b. Benchmarking

Benchmarking is a methodical process for comparing mechanism or big business performance or processes in different organizations, or between groups of organizations, to learn whether, and how, things may be done better [14]. To apply all the concepts of a limber bike, a sample bike on which it can be implementing was to be selected. After powerful market survey few bikes were shortlisted on which the limber bike can be developed. The parameters considered while selection of a benchmark bike were mainly dimensions, weight and cost [16].

Specifications	
Frame	Steel
Frame Size	26"
Brakes	Caliper (Rim Brakes)
Brakes lever	Plastic
Saddle	Comfort Air Flow saddle
Pedals	Plastic with Reflectors
Rims	Steel
Tires	Nylon Tire with Natural Rubber Moulded tubes
Wheel Size	26"
Gear System	Single Gear
Weight	14.5 kgs.

Table 2: Specifications of bicycle parts

c. Bicycle Frame

Based on safety cycle for upright cycle position, the frame layout comprising of two triangle which are 1. Rear triangle 2. Main triangle. It called as diamond frame which has to be very strong, light and stiff. They may combine with different shapes and matters [16]. This was to allow the rider to get down while exhausting a skirt or dress. The recumbent bicycle moves the cranks to a position forward of the rider instead of underneath, generally humanizing the slipstream around the rider without the characteristic pointed bend at the waist used by racers of diamond-frame bicycles [17]. Women Cycle having top tube which is joint at middle seat tube so that stand height is lower. It give comfortness to rider.

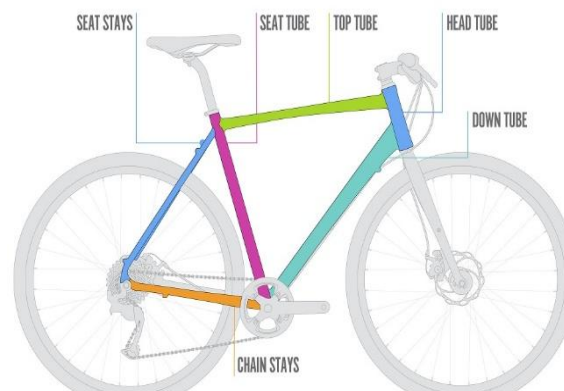


Fig. 6 Bicycle frame set

d. Frame Geometry

In compare dissimilar frame geometries, designers often compare the seat tube angle, head tube angle, (virtual) top tube length, and seat tube length [1]. The geometry of the frame depends on the intended use. Utility bicycle mainly point out on reassurance and has higher handlebars resulting in a standing riding position. Frame geometry also affects handling characteristics [9].

e. Frame Tube

Diamond frame comprising of main triangle and a paired rear triangle. The main triangle consists of the head tube, top tube, down tube and seat tube [7].

f. Frame size

The front frame consist of four tubes and they are 1. Top 2. Seat 3. Down 4. Head. The rear triangle consists of the chainstays, seatstays, and rear wheel dropouts [12]. Front and steering tubes are join at head tube.

g. Adjustable seat

It plays a key role in bicycle framing. Seat position is varies from cycle to cycle design. On basis of seat position riding part can be decide.

h. Cost estimation

Cost estimation is very important part in bicycle industry. To keep range very reasonable with good features is challenging task in market to survive.

Sr No.	Description	Amount (INR)
1	Bicycle Frame	1800
2	Handle bar	900
3	Mudguard	300
4	Wheel rim	900
5	Tire tube	650
6	Chain	200
7	Free wheel (rear)	100
8	Sprocket pedal bearing	300
9	Pedal	140
10	Seat	600
11	Brake set	200
12	Chain cover	150
13	Load carrier	200
14	Fastener & bearings	300
	Total	6740

Table 3: Bicycle cost estimation

VIII. CONCLUSION

After studying and analyzing Indian & International bicycle completely, I found there is strong need of one bicycle for different age group and for different modes. Bicycle size is also one of the challenge for kids and family bicycle segment. So I have decided with help of my guide that we will try to make one product which cover majority all segments of Indian Bicycle Industry. Many salient features are concluded from my study like Variable wheel base, Seat vertical movement, Seat longitudinal movement, Seat axial movement, Handle height adjustment, Handle longitudinal angle adjustment, Light weight (Aluminum) ,Variable Pedal Length etc. can designed in single bicycle which can cater large mass of people in India.

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