***IS 604 - SSS Bike Rental simulation***

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***High Level Description***

Three young entrepreneurs want to start a bike renting business, where they will station a fleet of bikes in different railway stations, shopping complex, place of attractions and busy street corners and allow people to rent bikes. Booking needs to be done online/over phone before hand and booking code and an ID swap is necessary to check-in to the attached kiosks. At the end of the rental period the bikes can be returned to any of the above locations where SSS(Acronym of the entrepreneurs’ initials- Saheli, Shipra & Sandipayan) operates (will model this if time permits, else will assume customer returns to the same location). SSS has done an extensive market research to identify and quantify different key business attributes. Based on that they want to simulate an inventory & profit model.

***Journal Papers***

1. Paul DeMaio, MetroBike, LLC ; “Bike-sharing: History, Impacts, Models of Provision, and Future” . Journal of Public Transportation, Vol. 12, No. 4, 2009

<http://bike.cofc.edu/bike-share-program/history%20of%20bike%20sharing.pdf>

2. Jia Shu , Mabel C. Chou, Qizhang Liu, Chung-Piaw Teo, I-Lin Wang ; “Models for Effective Deployment and Redistribution of Bicycles within Public Bicycle-Sharing Systems”

Operations Research; manuscript no. OPRE-2011-02-077.R2

<http://bschool.nus.edu/Staff/bizteocp/SMRT2013R2edited2.pdf>

***Problem Formulation***

1. Company charges rental based on demand and location. How much the company should charge for each location and for each demand period to make a minimum of 50% profit?
2. How many customers wait to get a bike on arrival? What the lost revenue each day?
3. Is the demand and supply proportionate? Can the company deploy more bikes? If so then on which locations?

***Proposed Methodology & Evaluation Measure***

Simio will be used to simulate the model. The model will be validated against the datasets below ( a final dataset will be created by taking input from these datasets below

<https://www.kaggle.com/c/bike-sharing-demand>

<http://www.capitalbikeshare.com/system-data>

***Key assumptions & Study Logic***

1. There are 50 railway stations, 50 shopping complex, 20 places of attractions and 100 busy street corners. The Company has 5,000 bikes in it’s disposal.
2. Bike rented and returned to street corners & places of attractions are more than shopping complex or railway stations. This follows a pdf shown below. But at the end of the day for a particular renting location the total rented and return bikes number are same on an average (will model this if time permits, else will assume customer returns to the same location).
3. Each location can be pre booked till 7 days before. On arrival if the customer cannot get a bike available he can get a credit of 1.5 times of the booking amount for future use.
4. It’s been observed that people like to wait for some time before opting for redeeming. Their patience decreases on an exponential rate.
5. Cost includes – space rental cost, fixed operating cost, fixed cost for each bikes including repair and depreciation per month.
6. In case of lost or stolen or damaged bike, i.e, if any customer doesn’t return the bike at all or causes damage to the bike, then the cost of the bike will be deducted from his security deposit. It is noted that 1% customer doesn’t return the bike at all. Also there will be a late fees charged based on the fee structure given below.
7. The system will estimate the bike stock at the time of customers booking and will stop over booking

Some of the parameters below in spreadsheet are left blank for time being which will be filled up after studying the model in greater detail using the below datasets and also some more datasets which we find along the way.

<https://www.kaggle.com/c/bike-sharing-demand>

<http://www.capitalbikeshare.com/system-data>



***Flowchart***

