UBC Social Ecological Economic Development Studies (SEEDS) Student Report
An Investigation into Sustainable Rentals: UBC Bookstore Bicycle Rentals
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Applied Science 261
November 27, 2014
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Executive Summary

The purpose of this report is to investigate the viability of a Bike Rental program for the UBC Bookstore. The Bike Rental program will provide students easy access to cheap, reliable, and environmentally friendly transportation. A detailed look at both primary and secondary sources was done to examine the benefits of this program both socially and environmentally as well as to get an idea of the demand for bicycle rentals as opposed to rentals of other kind of equipment.

The focus is on the three major areas where this program will have the most impact: economic benefits for the bookstore and students, social impacts on the campus and community, and finally the effects of the program on the environment. Research has revealed that a successfully managed and well planned bike rental program from the UBC bookstore will result in great benefits in all these areas. These include more student jobs, less carbon emissions, a campus that is more connected, and more.

To better assess the feasibility of a UBC Bookstore Bike Rental program, a triple bottom line assessment was conducted to evaluate the economic, social, and environmental aspects of the program. With regards to economic effects, research suggests that the program will not only provide a profit for the UBC Bookstore but will also present more affordable cycling transportation for students than is currently available. It would also present an opportunity for more student jobs and involvement with the UBC Bookstore. Socially, both research and survey results indicate that many students were in favour of affordable bicycle rentals on campus. Many of these students indicated that they would likely use bicycles more often if they were more convenient. For the environmental aspect, it has been shown that bicycles are a much more sustainable and form of transportation. In addition to this, purchase and maintenance of bicycles through bicycle recycling would also contribute greatly to reducing the amount of waste created.

A bicycle rental program run by the UBC Bookstore has been shown to be a viable rental service that is in demand, socially beneficial, and environmentally friendly. This report recommends that the UBC Bookstore invest in a trial bike rental program with a small fleet of 35 bikes either constructed by the UBC Bike Kitchen or bought relatively cheap in bulk. This trial period would best be done over the time of a spring session term, with the option of expanding the program to larger scale operation at a later time.

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Glossary

Word Definition

Convenience Articles/ services that are purchased frequently for immediate use in readily accessible stores and with a minimum of effort.

Economies of Scale

The cost advantages that enterprises obtain due to size, output, or scale of operation, with cost per unit of output generally decreasing with increasing scale as fixed costs are spread out over more units of output.

1.0 Introduction

The impact that cars, busses, and other forms of transportation have on the environment has become a prominent issue on campus and around the world. Encouraging sustainable and environmentally friendly transport has become an important goal at UBC, and a bicycle rental program would contribute greatly to this aim. Not only would a bicycle rental program play a role in reducing UBC's carbon emissions but it would also provide economic gains for many groups and help improve the community on campus.

Although bicycle rentals and sharing programs have been implemented in other campuses and cities, little research has been done to evaluate how to create a proper balance between the economic, social, and environmental aspects of this type of program. Extra attention must be given to how the program is designed so that it becomes profitable for the operator, desirable to students, and beneficial to the environment. There are many economic, social, and environmental considerations to be taken into account when creating a sustainable bicycle rental program.

The three major areas where this program will have the most impact are the economic benefits for the bookstore and students, social impacts on the campus and community, and the effects of the program on the environment. Research has revealed that a successfully managed and well planned bike rental program from the UBC bookstore will result in great benefits in all these areas. Exploring these aspects will determine the feasibility of implementing this program and help the UBC Bookstore to make an informed decision about expanding its rental services for the UBC Campus.

2.0 Methodology

2.1 Process of Gathering Information

The action that our group decided to take first was to brainstorm a number of possible rental ideas and present them to the public to choose from. We then took the most suitable of the popular ideas and devised another survey to gather additional information, as well as keeping in touch with our stakeholders. With this additional data we then took a detailed look at implementing the program through intensive research of numerous peer reviewed and other secondary sources.

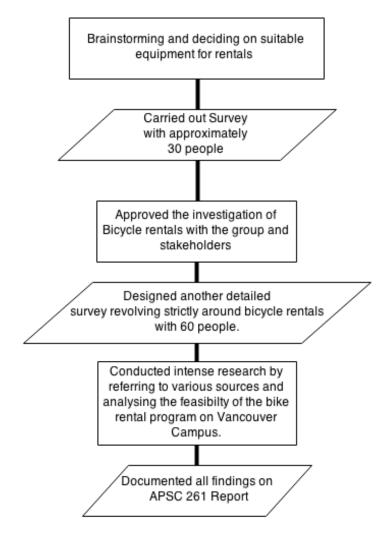


Figure 1: Flow Chart - Consultation and Research Process

After we completed this process the results and data that we found were summarized and included in this report.

2.2 Analysis of Primary and Secondary Sources

We consulted many secondary sources that range from peer reviewed journals on how to implement bike sharing programs to news articles reflecting the public's opinion on such programs. Part of our primary investigation is to create a survey to gauge the public's response to a UBC Bookstore extended rental service and what the ideal rental service would include.

Our primary sources were the two student surveys we conducted, the results of which are included in the Appendix. Although we had a smaller sample size than normal, we made sure to get relevant results by conducting the surveys in person and outdoors, around the campus. This let us obtain the opinions of those who were most likely to be affected by the program as well as those who would have the opportunity to use the program. The surveys were designed so they gave us the information we needed without biasing those who participated. The information we received from these primary sources was useful, as it gave us a good idea of what students wanted, as well as how to approach the task of devising our recommendations.

The secondary sources that we found were various articles about bicycle rentals and bicycle sharing, for both general and specific cases. We made certain that all the sources that we used were from reliable origins and based upon some sort of research. These secondary sources were very useful in giving a detailed understanding of how to go about setting up a program similar to the one described in this report. They were also useful in providing examples of what methods produce positive outcomes as well as what problems could arise. Therefore, the secondary sources we used for this report were instrumental in determining what form a bicycle rental service should take at UBC.

3.0 Economic Aspects

3.1 Background Research

A major cause of failure in bike renting and sharing programs was the use of technologically advanced bicycles that involved the use of gears and lightweight materials such as carbon fibre or low-density aluminum. Such kinds of bicycles are very expensive and required a big investment in capital (Chung, 2007).

A similar concept, the "Bike Sharing" phenomenon had also been tried on-campus earlier as well. But such programs have not gained momentum among students, mostly due to the following reasons:

- 1. Lack of awareness and marketing A lot of students are unaware about the renting of bicycles on campus.
- 2. Very expensive start-up costs for students Most programs require compulsory membership for use of equipment. Students get discouraged when they have to pay upwards of 15 dollars to rent their first bicycle on campus. Such programs also price their bikes upwards of 25 dollars a day (Smedbol, 2012).
- 3. Members only access The strategy of providing equipment to members only prevents wide-scale access and act as a deterrent. A potential client (student/faculty/staff) need not be a member in order to avail the benefits (Dell'Olio, 2011).
- 4. Inconvenient access points Pick-up & drop-off spots for bicycles before and after use that are located at odd positions can cause reluctance among students. Hence access points not present in high traffic areas leads to poor participation and business (Dobrovolny, 2013).
- 5. Lack of appeal The lack of influential marketing that does not convince students by addressing the appropriate reasons to rent out bicycles (Summers, 2014).
- 6. Lack of maintenance Equipment is not taken care of correctly, thus removing the pleasure and advantages of cycling.

In order to combat the above obstacles the following steps should be proposed

• Heavy focus on marketing. Students have to be influenced and convinced in order to ensure successful participation. The spotlight has to be thrown on the saving of "Time" and also avoiding the "Dull" and "Gloomy" weather. Use of catchy phrases such as "#RAINcouver" can be used to signify the weather. Students have to be made to realise the potential of saving

time when a bicycle is used to commute from one corner of campus to the other between classes.

- Affordable pricing of bikes. The price of renting bicycles is the core of the entire program. The bikes have to be charged at a rate such that they convey the significance of a convenience good. For example, a bike can be priced at a cost of about \$5 a day. At such a price point, a student in need of transportation would not hesitate to rent out a bike because the opportunity cost of the money spent is equivalent to something as ordinary as a burger, a cup of coffee or something insignificant. Attractive price points will lead to more participation (Dell'Olio, 2011).
- Heavy focus on marketing the positive health and social benefits should be established, in order to promote student/faculty/staff well-being (Quay Communications Inc., 2008).

3.2 Economic Advantages for the Bookstore

The UBC bookstore is situated near the 2 main bus loops and hence most students come across the bookstore en-route towards their classes. As such the convenient location of the bookstore is a major benefit.

The Bookstore can collaborate with the UBC Bike Kitchen to ensure that help is provided with the maintenance of bicycles. Additionally, the UBC Bike Kitchen specialises in making bicycles from scratch from inexpensive materials. A partnership can be looked into where an opportunity for student employment can arise along with reducing the cost of each bicycle per unit due to 'economies of scale' (Dell'Olio, 2011).

There is also a major seasonal advantage during summer season. UBC is a major tourist attraction during the summers because of places like the Nitobe Memorial Garden and the Beaty Bio-diversity Museum. When coupled with the amazing Vancouver weather, biking on campus can be considered as an enjoyable leisure activity, thus providing an opportunity for increase in business from tourists.

The program also provides additional advertising real estate. If a great number of bicycles are under the ownership of the UBC Bookstore, then it can use them as space for advertising the various offers and promotions available at the store. Since it is probable that these bikes will be travelling to every corner of campus, this strategy will ensure viewership of the advertisements on campus.

3.3 Income

• Pricing Model

	Non-Member	S	Members	
Prices	Per day	Per week (5 days)	Per day	Per week (5 days)
	\$ 6	\$ 15	\$ 5	\$ 13

Figure 2: Table - Estimated Bike Rental Prices

Memberships would only be introduced when 80 percent of capital is recovered. This
will ensure that uniform earnings take place initially.

Fines

It will also be necessary to charge a student/ impose a fine in case he/she is not able to return the bike at the due time.

- o Fines will be imposed on respective student account if bike is not returned within 2 days of return date. Fines will be equivalent to cost of bike + (0.1* price). This will ensure recovery costs of bike plus additional 10 percent of original cost, as well as deterring vandalism and theft (Shaheen, 2011).
- A price of \$3 will be imposed if a student returns a bike the next day before 12 pm and \$6 if returned before 5 pm.

3.4 Recommendations for Economic Success

Trial Phase and Testing:

In order to properly gauge the feasibility of the bike rental program on the UBC Vancouver campus, we propose a trial period for the duration of 1 complete Winter Session Term e.g. September 1 to December 18 (around 15 weeks).

The financial breakup for this trial period is shown in the following table:

Trial	Avg.	Total Cost	Ideal	Ideal	Ideal Income
Number	Cost per	of	Income of	Income of	of Entire
of Bikes	Bike	Purchase	first week	first month	Trial Period
35	\$70	\$35*70 = \$2450	\$15*35 = \$525	\$525*4 = \$2100	\$2100*3.5 = \$7350

Figure 3: Table - Estimated Bike Rental Expenses and Income

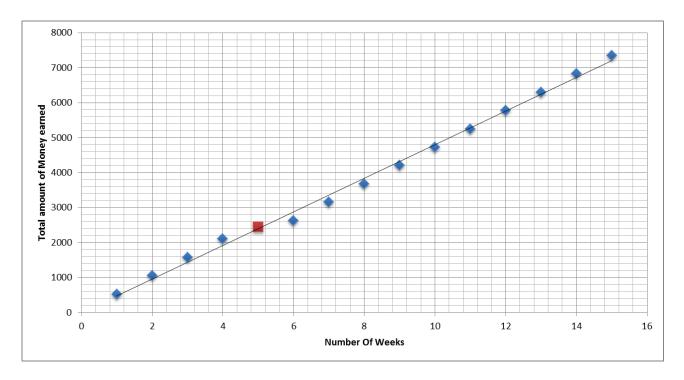


Figure 4: Graph - Timeline of Profits

The above graph shows that if a perfect situation occurs, i.e. assuming that for every week there are 35 students who rent all the bikes for the entire week, it would take approximately 5 weeks to recover initial investments on the bikes. However, in a real life situation it would be advisable to estimate a period of 10 weeks for the recovery of the initial investment.

Initial Investments – Assuming the bookstore invested in 35 simple non-geared bicycles at the rate of \$70 each inclusive of all taxes, the start-up investments would be around \$2450.

Approachability / Student Friendly – All bicycles are planned to be rented at \$15/week. Such low prices of bike rentals are definitively student friendly and affordable.

Profits – As per the graph above, in a perfect situation it would take no less than 8 weeks (1.5 months) to recover initial investment and make substantial profits.

4.0 Social Aspects

This section examines the 'preferences' of the UBC community for the proposed bicycle rental program. Also it examines the impacts this program might have on campus life.

4.1 Preferences

Multiple surveys were conducted to determine how popular the program would be among students. Surveys were conducted in person across the campus. The approximate sample size for the survey was selected to be 60 students. The following questions were asked in the second, more detailed survey:

- 1) How likely are you to rent a bike for a week, month or a term from UBC bookstore?
 - a) Very likely, b) Likely, c) Neutral, d) Not Likely
- 2) Why specifically would you like to rent a bike?
 - a) Convenience, b) Better Health, c) Sightseeing, d) Recreational purposes

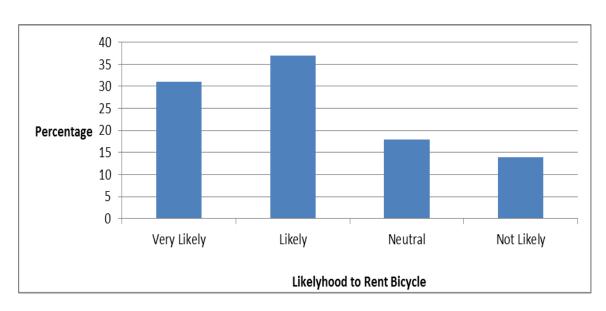


Figure 5: Statistics - Student Response to Bicycle Rentals Source: Student Survey # 2

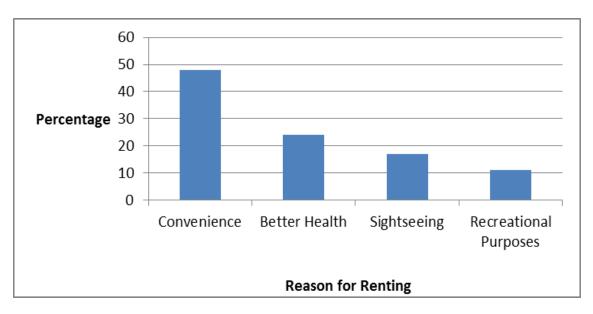


Figure 6: Statistics - Student Reason for Renting Source: Student Survey # 2

From the results of first question, it can be concluded that the idea of a bicycle rental program already holds much popularity around the campus, with almost 68% student saying they are either likely or most likely to rent bikes. If implemented efficiently, this program can be of great success economically along with both the social and environmental impacts discussed in their respective sections.

The results of the second question give a brief insight to why students will prefer renting bikes. The most popular choice was the convenience that bikes may offer for students that need to move across campus and in-between classes. About 48% students chose convenience as their major inspiration to rent a bike. Other popular choices were health benefits, sightseeing and recreational purposes.

Based on these results we can conclude the importance of the social aspect of this program oncampus.

4.2 Impacts

While conducting this research three main effects were identified that would have a positive impact on the UBC community.

4.2.1 Mental and Physical Health

Cycling can be a good exercise and can help reduce mental stress as well improve physical fitness.

Cyclehelmets.org lists following benefits of cycling (BHRF, 2011):

- Cycling helps improve immune system of the body.
- Cycling reduces the chances of heart attack and other cardiovascular diseases.
- Reduce spinal diseases and back pains.
- It counteracts anxiety, depression and other psychological problems.
- Cycling trains and tightens up the muscular system.
- Improves oxygen circulation inside body.
- Burn body weight.
- Control blood pressure.
- Improves stamina and overall quality of life.

As such, the increase cycling activity around campus will help build a healthy community on-campus.

4.2.2 Easy Accessibility

One of the primary benefits of cycling is that it reduces the time wasted in walking as well as being energy efficient. UBC has a very big campus, where walking time between classes can be as much as 20 minutes. Students living on campus can find it difficult to commute to shopping stores such as "Save on Food" and they either have to call a taxi or take a bus. Bicycle rental program can target such students, providing them with shopping friendly cycles including a shopping basket. It can save students money as well as reduce the carbon emissions around campus. Furthermore, cycling to classes equates to less time spent in cold weather outside and therefore less likely-hood of getting sick.

4.2.3 Employment Opportunities

Bookstore bike rentals will create employment opportunities on-campus, for handling and maintenance of cycles. Offering positions to students is definitely possible and students can be employed part-time, which will benefit them financially as well as provide them with handy experience. Following are areas where new employees might be needed include:

- Daily and monthly maintenance of bicycles
- Bike storage responsibilities
- At reception desk for the rental program

Another organisation, the UBC Bike Kitchen, is a non-profit body employing students. They can play an important role in this program, providing bikes produced from recycled material as well as repair & maintenance services. A healthy partnership between Bookstore Rental and Bike Kitchen will result in more employment opportunities for students.

Additionally there a few more elements specific to UBC which need to be looked into when creating a bicycle rental program here:

The use of helmets - Laws in British Columbia dictate that all bicycle riders must wear helmets at all times. To tackle this, all customers/clients will be instructed to bring their own helmets to campus. If a need for renting bicycle helmets does arise, the bookstore can investigate into the matter and rent them with the bicycles accordingly (Lucas, 2010).

The storage of bicycles - The bookstore can initially use a few bicycle stands around the bookstore for the purpose of this initiative. In order to protect the bicycles from elements of weather, the cheapest and most effective way would be to cover the bicycles using plastic covers resembling the ones used for cars. The budget for purchasing these plastic covers can be decided by the bookstore authorities and the stakeholders. From there, additional cover and space can be looked into and the University authorities should be contacted.

5.0 Environmental Aspects

5.1 Carbon Impact

If there are more bicycles being used on campus, the amount of shuttle busses that are running on campus could be significantly reduced. With global warming as one of the major concerns in today's world, reducing the emissions of carbon dioxide, the greenhouse gas most responsible for global warming, is an important objective (Shaw, 2011). Motor vehicles are one of the the largest source of greenhouse gasses and air pollutants. By comparison, bicycles have no emissions; meaning that bicycles will have much less of a carbon impact on the environment compared to cars or busses (Austen, 2012). The ecological footprint of riding a bike is much smaller than that of taking a shuttle bus or car. Even electric powered vehicles with no emissions still require the still require burning fossil fuels and other methods to provide the electricity. Therefore, bikes still have a huge advantage over almost all other forms of transportation. Apart from walking, bicycling is the most efficient form of transportation that relies only on human power (Shaheen, 2010). The only thing even close to emissions from cycling is the carbon dioxide we exhale when breathing which is far less than the carbon dioxide that comes from a car or bus (Austen, 2012). With more people riding bikes, we can help maintain our air quality and avoid polluting the air through motor transportation.

5.2 Usage

Shorter terms of bicycle renting means that they will be in use more often than if they belonged to a single person (Shaheen, 2011). Bike rentals allow bikes to be used more efficiently. This means that the earth's resources are being used in a more sustainable way. Additionally, bicycles will be reused and recycled instead of being thrown away into a land fill. Proper placement of bike stations near central hubs will make the bicycles a viable alternate transport for students who have back to back class in the opposite ends of the campus (Dobrovolny, 2013). UBC is already established as a green campus, and by having bike rentals on campus it increases UBC's reputation as being one of the leading universities when to comes to sustainability. A possible indicator to gauge usage is comparing change in the frequency of the usage of bicycles to the usage of motor transport. By promoting people to ride bikes on campus, we are encouraging them to be healthier. Healthier people usually produce less waste by making healthier choices (BHRF, 2011). People who bike often develop an increased awareness for the environment through the exposure to the outdoors on a regular basis.

5.3 Recycling

Bicycles can be recycled and refurbished instead of simply being replaced, resulting in less waste. Broken bicycles can also be used for spare bike parts and accessories. There is more of an incentive for the operator to repair the bicycles rather than replace them, reducing the cost of purchasing bicycles (Austen, 2012). Purchasing used bicycles instead of brand new bicycles is an option that would reduce the start-up cost of the program greatly. All of these methods would promote sustainability by reducing the amount of harmful waste created and the impact on the environment. However there are also some unavoidable impacts on the environment from bikes that we should also consider and make sure to minimize. Making bike frames and parts require energy and raw materials. Most of the time, this energy comes from non-renewable fossil fuels. A bike with even a light frame will be responsible for approximately 5 kilograms of carbon dioxide (Austen, 2012). With respect to the bikes that we are proposing that the Bookstore buy, they do not have any expensive and harmful carbon fibre frames or anything similar. Carbon fibre is not biodegradable or photodegradable since it is a combination of materials. Carbon fibre frames have performance benefits that are unnecessary for riding around campus, and a negative impact on the environment, which is why we suggest avoiding high performance bikes similar to those that some stores rent. However, it is important to remember that the amount of energy that is required to produce a bike is far less than the amount of energy required to produce motor vehicles. With simple designs and frames, the amount of energy and materials required become negligible compared to other forms of transportation (Quay Communications Inc., 2008).

6.0 Conclusion

Here is shown the results of our triple bottom line analysis on the potential impacts of a bicycle rental program operated by the UBC Bookstore. From an economic perspective, research suggests that the program will not only provide a profit for the UBC Bookstore but will also present more affordable cycling transportation for students than is currently available. It would also present an opportunity for more student jobs and involvement with the UBC Bookstore. With regards to social effects, both research and survey results indicate that most students were in favour of affordable bicycle rentals on campus. Many of these students indicated that they would likely uses bicycles more often if they were more convenient. An environmental point of view shows that bicycles are a much more sustainable and environmentally friendly form of transportation. In addition to this, purchase and maintenance of bicycles through bicycle recycling would also greatly reduce the amount of waste created.

Overall, a bicycle rental program run by the UBC Bookstore has been shown to be a viable rental service which is in demand, socially beneficial, and environmentally friendly. Therefore our group strongly recommends that that the UBC Bookstore invests in a trial bike rental program with a small fleet of 35 bikes either constructed by the UBC Bike Kitchen or bought relatively cheap in bulk. This trial period would best be done over the period of time of a winter or spring session term, with the option of expanding the program to larger scale operation at a later time.

References

- Austen, K. (2012, March 15). Examining the lifecycle of a bike and its green credentials. Retrieved November 12, 2014. This news article discusses some the environmental impacts of bicycling. This information is based on facts and interviews. This article gives some useful information about the life cycle of bikes and its impact on the environment.
- BHRF. (2011). The Health Benefits of Cycling. Retrieved November 15, 2014, from http://www.cyclehelmets.org/1015.html

 This website describes the health benefits of cycling. It is a reliable source which took into account
 - many articles written by health experts around the world. It is a useful source for determining all the possible health benefits of cycling.
- Chung, M. (2007, April 10). Toronto BikeShare program kaput. Retrieved October 20, 2014.

 This news article describes how a bike sharing program in Toronto shut down due to funding issues. The information is based upon facts as well as interviews with the city and company. This article was useful as it gives an idea of the types of problems a bike sharing program will have to overcome.
- Dell'Olio, L., Ibeas, A., & Moura, J. (2011). Implementing bike-sharing systems. *Proceedings of the ICE Municipal Engineer*, 164(2), 89-101. Retrieved October 20, 2014, from ICE Virtual Library.

 This scholarly journal article describes a methodology for implementing a bike sharing program based on the situation. The information is based upon research and has reputable sources. This journal was useful as it gives a good plan of action on how to implement a bike sharing program.
- Dobrovolny, J., & General Manager of Engineering Services. (2013). Vancouver Public Bike Share. Retrieved October 20, 2014, from http://former.vancouver.ca/ctyclerk/cclerk/20130723/documents/rr2.pdf

This scholarly report gives an overview of the proposal of a bike sharing program in Vancouver, including potential issues and solutions. The information is based upon research and has reputable sources. This report was useful as it gives an in depth look at implementing a bike sharing program locally highlighting many of the issues and solutions that we have to consider.

Lucas, C. (2010, November 9). Helmet law hurting shared bike scheme. Retrieved October 20, 2014.

This news article raises the issue of mandatory helmet laws complicating bike sharing programs in

Australia. The information is based upon facts and has reputable sources. This article was useful as

British Columbia also has mandatory helmet laws and so the same issue must be taken into account here.

Quay Communications Inc. (2008). TransLink Public Bike System Feasibility Study. Retrieved October 20, 2014, from

http://www.translink.ca/~/media/Documents/cycling/public_bicycle_system_investigation/Public Bicycle System Investigation - Executive Summary.ashx

This scholarly study evaluates the feasibility of a Public Bicycle System for Metro Vancouver and recommends a business strategy. The information is based upon research and has reputable sources. This study was useful as it gives an in depth look at the economic aspects of implementing a bike sharing program locally.

Shaheen, S., & Guzman, S. (2011). Worldwide Bikesharing. EScholarship, University of California.

This scholarly article takes a broad look at bike sharing programs around the world, focusing on which systems have succeeded. The information is based upon research and has reputable sources. This article was useful as it gives a good overview of the different types and implementations of many different bike sharing programs.

- Shaheen, S., Guzman, S., & Zhang, H. (2010). Bikesharing in Europe, the Americas, and Asia. *Transportation Research Record: Journal of the Transportation Research Board*, 2143(1), 159-167. Retrieved October 20, 2014, from http://trb.metapress.com/content/92836574U717N007

 This scholarly article takes a look at past and present bike sharing programs and then proposes and new generation of bike sharing program. The information is based upon research and has reputable sources. This article was useful as it gives a new perspective on bike sharing programs, allowing room to create a new type of program.
- Shaw, K. (2011, June 20). Bike Sharing Program Rolls on Campus during Summer. Retrieved October 20, 2014. This news article describes the implementation of a new bike sharing program at the Georgia Tech campus. The information is based upon facts and interviews with viaCycle and Georgia Tech. This article was useful as it gives an idea of how a bike sharing program could be implemented here at UBC.
- Smedbol, E. (2012, March 7). Purple and Yellow Bikes. Retrieved November 15, 2014, from http://bikecoop.ca/programs/purpleyellow/

This website describes the Bike-Coop's bike sharing program. The information is based upon facts and information given by the Bike-Coop group. This article was useful as it gives ideas of how to implement a bike program and who to contact at UBC.

Summers, N. (2014, January 21). Bike Sharing Crashes in Canada - Businessweek. Retrieved October 20, 2014. This news article describes how the bike sharing company Bixi went bankrupt in Montreal. The information is based upon facts and has reputable sources. This article was useful as it gives an idea of some of the issues that bike sharing programs may face and the difficulties that companies are currently having.

Appendix

Survey example and results

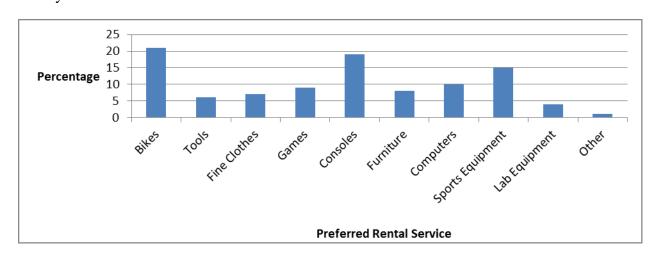
Survey 1:

UBC Bookstore Rentals

Preferred Category of Rental Items

- Bikes
- Tools
- Fine Clothes
- Games
- Consoles
- Furniture
- Computers
- Sports Equipment
- Lab Equipment
- Other, please specify...

Survey 1 Results:



Survey 2:

- 1) How likely are you to rent a bike for a week, month or a term from UBC bookstore?
 - a) Very likely
 - b) Likely
 - c) Neutral
 - d) Not Likely
- 2) Why specifically would you like to rent a bike?
 - a) Convenience
 - b) Better Health
 - c) Sightseeing
 - d) Recreational Purposes

Survey 2 Results:

