

The Economic Impact of the Bicycle Industry in Portland

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Executive Summary

Bicycling in Portland, Oregon has gone through a remarkable development in recent years. Ridership has more than doubled since 2006 to 23,000 commuters per day – that is 7% of all commute trips – and the bicycle network has been extended to well above 300 miles in length. In the light of this development, this project focuses on the economic impact of the Portland bicycle industry, and the needs and trends of the industry as perceived by bicycle-related businesses in Portland. The total economic impact is estimated through an economic impact analysis using 2013 data from the Quarterly Census of Employment and Wages as well as 2015 data about the size and composition of the bicycle industry collected by the authors of this study. The perceived trends and needs of the industry is represented by 32 responses to an online distributed questionnaire.

Economic impact analysis: As of September 2015, the Portland bicycle industry is comprised by 217 businesses divided by retailers (100), manufacturers (78), wholesale/distribution (8) and service businesses (31) employing almost 1,500 people who are paid \$39.4 million in compensations. The largest employment sectors are retail (800 jobs) and manufacturing (460 jobs) while the service and wholesale/distribution sectors are small in comparison (amounting to 200 jobs in combination). In total, the industry sales amount to an annual \$296 million with manufacturers and wholesale/distribution businesses accounting for two-thirds of the sales. Accounting for both direct, indirect, and induced impacts, the economic activity of the Portland bicycle industry supports a total of 2,300 jobs with a total compensation of \$82.7 million. The total value added to the local economy is \$133.7 million annually and the total output of the industry is \$315.5 million. The sector with the largest employment in the industry is retailers. In total, the economic impacts of the bicycle industry generates \$27 million in taxes of which \$10 million is in state and local taxes.

Historic and future trends: Since 2002 the bicycle industry has experienced high growth rates and have gone from a total of 22 businesses (2002) to 217 (2015). Thus, average annual growth rates between 2002 and 2013 was 12.97% for the number of businesses and 11.45% for the number of employees. Projections of the size of the bicycle industry in 2030 is based on an extrapolation of historic trends in the industry between 2006 and 2015, drawing on data from previous studies as well as the result of this study. Based on this assumption, the projection show a substantial increase in size by 2030 seeing more than a tripling in the number of businesses.

Perceived needs and trends of the industry: Portland is perceived as a city which has a strong bicycle friendly reputation and a good network of bicycle routes. Investments in bicycle infrastructure and facilities, and the bicycle friendly reputation of Portland are perceived as the prime drivers for growth in the bicycle industry. There were general concerns regarding a perceived stagnation in the provision of new facilities and especially the off-road network was deemed inadequate. Three factors influencing the conditions of the industry were rated as ‘essential’ by more than a third of the respondents; ‘quality of life’ in Portland, ‘ability to attract qualified employees’, and ‘access to appropriate commercial space’. Surprisingly, many of the respondents did not rate the performance of Portland for the chosen factors but instead responded either ‘Neutral’ or ‘Don’t know’. A disjuncture between the importance rating of the factors and the perceived performance of Portland is used as a sign of potential focus areas. These include the factors ‘access to appropriate commercial space’, ‘a good network of unpaved bicycle routes’, and ‘the tax and regulatory environment’.

Addressing the needs of the bicycle industry: Firstly, the bicycle-related businesses see a clear causality between the provision of bicycle infrastructure and the success of the industry. It seems a clear objective for the City to keep promoting the extension of the bicycle networks, paved as off-road routes, as well as promoting general bikeability and thereby also maintaining and developing Portland’s bicycle friendly reputation. Secondly, as the bicycle industry consists mainly of small businesses, many of the issues that the businesses report to face are linked to general issues of affordability and larger economically and regulatory frameworks in the city. Addressing some of these issues could ease the condition for many of the bicycle-related businesses but are naturally linked to larger policy questions across the city and not exclusively to the bicycle industry. In

general, the bicycle industry seems to thrive under the success of Portland as a bicycle city and efforts should therefore be specifically directed at maintaining and improving these conditions for the benefit of bicyclists and bicycle-related businesses alike.

Significance of the bicycle industry: By all measures the bicycle industry comprises less than 0.5% of the local economy. However, the industry possesses several important qualities that are essential to the local economy. Firstly, it is likely that it will grow towards 2030. This is evident by historical trends, the clear link to infrastructure investment, general perceptions in the industry itself, and by the projections made in this study. Secondly, the inherent properties of the industry point to a resilient industry capable of supporting further growth. The industry is diverse in the sense that it spans over several sectors but also since there seems to be businesses in every step from the production and assembling to the sale and maintenance of a bicycle as well as services for bicyclists. From a regional economic perspective, such a network of small and interconnected businesses is an invaluable asset that provides a sound basis on which the industry can grow through new start-ups and relocations of businesses from other regions attracted by Portland's bicycle friendly reputation.

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1 Introduction

Since the beginning of the 1990s, Portland has seen an impressive rise in the number of Portlanders making their way to work, doing their daily errands, and traversing the city on a bicycle. In 2014, 7% of all commute trips in Portland (more than 23,000 trips daily) were made on a bicycle. This is the highest share for any major city in the nation. For comparison, the national share is 0.6%. More than 300 miles of bikeways now connect most areas of the city ranging from low-stress neighborhood greenways to high-class buffered bike lanes for quick access to jobs, shopping, restaurants, and recreation. The 2015 Sunday Parkways events where bicyclists take over the streets of a different neighborhood a Sunday each month from May through September brought more than 119,000 Portlanders and visitors to the streets exemplifying Portland's thriving bicycle culture.

Initiatives spurred by active local citizens of the 1970s laid the groundwork for a more equal focus on transportation choices that has continued to grow a contingent of bicyclists that continue to redefine mobility in Portland. In the early 1990s, around 3,000 Portlanders made their daily commute by bicycle on a network of 80 miles of bikeways. However, something changed during the 1990s with the development of a comprehensive *Bicycle Master Plan* in 1996 and a large increase in the size of the biking network, the number of bicyclists grew radically throughout the 2000s and 2010s. It is on the basis of this success that the *Portland Bicycle Plan 2030* was adopted in 2010. The plan proposes a vision for 2030 for an even more bicycle friendly Portland and addresses a wide range of means to achieve such an end; from education to infrastructure. The plan describes a “world class system” for bicyclists that would add 767 miles of path to the existing 319 miles and the already funded 44 miles. The cost of the world class system is estimated at \$581 million (\$2010). This is compared to the \$23 million for the already funded (at the time of the adoption of the plan) 44.2 miles of path and the estimated replacement cost of the 319 miles of already developed paths of \$60.7 million (both \$2010).

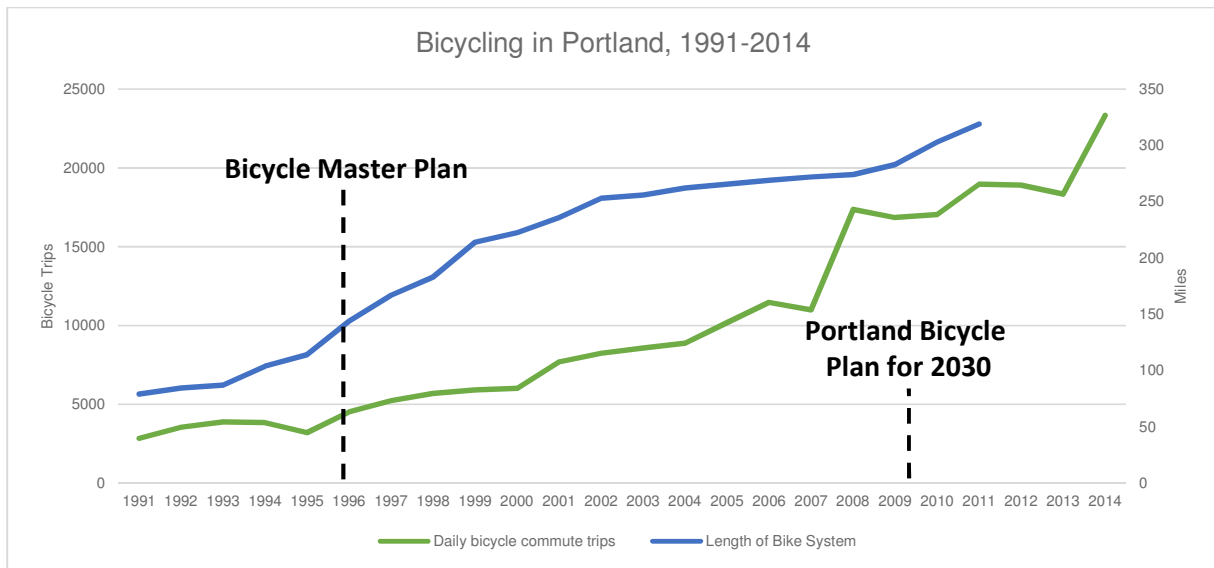


Figure 1: Development in number of bicyclists and size of the bicycle system in Portland, 1991-2014. Data is from the Portland Bicycle Plan for 2030 (2010) and United States Census Bureau (2015). Note that the Daily bicycle commute trips data is comprised of bridge counts (1991-2005) and census data (2006-2014).

Portland has been awarded various awards for its efforts to improve conditions for bicyclists; it was named the nation's best bike city in 1999, 2001, 2006, 2008 and 2012, and is named a “platinum” bicycle friendly community by the League of American Bicyclists which is its highest rating. Portland's bicycle-friendly reputation and expanding bicycle culture has created what seems to be favorable conditions for businesses

related to bicycles – in one way or another. While Portland has not traditionally been home to any of the large bicycle companies, as for example Colorado has, the recent years have seen the relocation of several larger businesses in the sector. In general, bicycle-related businesses seem to be emerging all over the city; from local neighborhood bicycle shops, to manufacturers of bicycle parts, accessories, apparel, and outerwear as well as a variety of services oriented towards two wheeled consumers. These businesses are reinforced by, and further reinforcing, the bicycle culture in Portland. The result is what appears to be a vibrant, growing bicycle industry.

A prior study, commissioned by the Portland Bureau of Transportation and carried out by Alta Planning+Design, was aimed at characterizing the bicycle industry and estimating its impact on the local economy in 2006 with a follow-up study in 2008. The study concluded that the bicycle industry consisted of around 140 businesses in 2008 and sustained 850-1150 jobs. The economic activity in the industry, the study estimated, was approximately \$90 million (\$2008) dominated by the retail segment of the industry but with an increasing manufacturing segment. Since the economic impact study, Portland has seen an increase in daily commute trips by bicycle of 12,000 (a 100% increase), the mode share of bicycles going from 4% to 7%, a substantial increase in miles of bikeways, and the adoption of a comprehensive bicycle plan with a strong vision for 2030. It is in the light of these changes that this study is analyzing the economic impacts of the Portland bicycle industry in 2015. While the 2006 and 2008 studies focused on characterizing the industry and estimating its direct economic impact on the local economy, this study expands on the methodology and is estimating the total economic impact of the industry on the local economy. In addition, this study also analyzes the perceived trends, needs, and issues of the industry as identified by bicycle-related businesses in Portland. Lastly, the study sheds some light on the relationship between ridership, investments in infrastructure, and the growth in the bicycle industry in a brief discussion, and provides recommendations for measures to support the bicycle industry, based on the results of the analyses carried out.

2 Prior Studies on the Economic Impacts of Bicycle Industry

This review of prior studies on the economic impact of bicycle-related businesses focuses on the methodologies of the studies included. It aims at establishing an overview of relevant prior studies in order to inform the methodology of the project as well as presenting an overview of similar studies carried out across the nation. The review does not include studies (solely) concerned with socioeconomic effects of bicycling (for such see for example Gotschi (2011) or Gössling & Choi (2015)). Instead, the review will focus on studies including estimates of local economic impacts of bicycle-related businesses. Many studies to date have focused on local effects of implementing bicycle infrastructure looking mainly at small spatial entities such as streets or neighborhood business districts (The Clean Air Partnership, 2009; Stantec, 2011; Transportation Alternatives, 2012; Rowe, 2013; Clifton, Muhs, Morrissey, & Currans, 2014; New York City Department of Transportation, 2014). While the socioeconomic approach is too broad (macro level) for the purpose of this project, the neighborhood business district focus is too geographically narrow (micro level). This review would ideally focus on a scale in between the macro and micro level (meso); the city. However, few studies has been made focusing on the city-scale. Instead, most meso-level studies focus on federal state entities. Hence, this literature review is focused on studies concerned with statewide impacts based on the assumption that methodologies applied on a statewide scale will be applicable on a citywide scale as well (when concerned with larger cities).

The review¹ includes six studies of local economic impacts of bicycle industries from across the United States (table 1). They vary in complexity, some assessing only direct economic impacts of the bicycle industry (Dean Runyan Associates Inc., 2014; Iowa Bicycle Coalition, 2011; University of Colorado , 2000) while others include both direct, indirect, and induced impacts (Brown & Hawkins, 2013; Bicycle Federation of Wisconsin, 2005; Resource Systems Group Inc., 2012). One-third of the studies use a combination of data gathering through surveys and subsequent economic impact analysis via input-output models (Brown & Hawkins, 2013; Resource Systems Group Inc., 2012). The rest use one of the two. In general, there is a great deal of variation of the scale of the studies; from overview and characterization only to complex economic impact studies assessing impacts throughout the local economy.

Table 1: Overview of studies included in the literature review. Note: Brown & Hawkins (2013) and Resource Systems Group Inc. (2012) is concerned both with the effects of bicycling and walking.

<i>Report, author, year</i>	<i>Geographic scale</i>	<i>Main methodology</i>	<i>Impact factors included</i>
<i>Oregon Bicycle Industry - Regional Economic Significance (Dean Runyan Associates Inc., 2014)</i>	State (Oregon)	Survey	Direct
<i>The Economic Impacts of Active Transportation in New Jersey (Brown & Hawkins, 2013)</i>	State (New Jersey)	Survey, economic modelling	Direct, indirect and induced
<i>Economic Impact of Bicycling and Walking in Vermont (Resource Systems Group Inc., 2012)</i>	State (Vermont)	Survey, economic modelling	Direct, indirect, and induced
<i>Economic and Health Benefits of Bicycling in Iowa (Iowa Bicycle Coalition, 2011)</i>	State (Iowa)	Survey	Direct
<i>The Economic Impact of Bicycling in Wisconsin (Bicycle Federation of Wisconsin, 2005)</i>	State (Wisconsin)	Economic modelling	Direct, indirect and induced
<i>The Economic Impact of Bicycling in Colorado (University of Colorado , 2000)</i>	State (Colorado)	Survey	Direct

In the studies, a great variation of industry size can be observed; from 397 jobs sustained in Iowa in 2011 to 3,001 jobs² in New Jersey in 2013 (Iowa Bicycle Coalition, 2011; Bicycle Federation of Wisconsin, 2005), and from \$17.6 million in total sales in Iowa in 2011 to \$1,043 million in total sales in Colorado in 2000 (not

¹ For a more in-depth description of the findings of the review as well as a description of the methodology used see sub report I of this project.

² The study also includes the effects of walking.

adjusted for inflation) (University of Colorado, 2000; Iowa Bicycle Coalition, 2011). Not all studies estimate the bicycle industry's total impact on the local economy (direct, indirect, and induced impacts) but those that do find impacts of \$56.3 million¹ (Vermont, 2012), \$290 million¹ (New Jersey in 2013), and \$556 million (Wisconsin in 2005) (Resource Systems Group, Inc., 2012; Brown & Hawkins, 2013; Bicycle Federation of Wisconsin, 2005). A study from 2014 estimates the total sales of the bicycle industry in Oregon to be \$440 million, sustaining 2,645 jobs (Dean Runyan Associates Inc., 2014). Locally in Portland, total economic activity of the bicycle industry was in 2008 estimated to be \$90 million, sustaining between 850 and 1150 jobs (Alta Planning & Design, 2008).

Most of the studies base their findings primarily on survey data (except Bicycle Federation of Wisconsin (2005); it is unclear where their data originates from). This is problematic especially for two reasons: (1) the general low response rate across the studies, and (2) the uncertainty involved with asking for numbers such as sales and revenues expecting the respondents to know these by memory. This is especially true for smaller businesses which includes many bicycle-related businesses such as bike shops and bike repair shops. These issues question the generalizability of the findings of the surveys. However, in many cases exactly this data is the basis for an economic impact analysis.

On the basis of the findings of the literature review, it is advisable to use a similar approach as the more extensive and complex studies reviewed here. It is crucial for the validity of the study that reliable data sources is used. The tendency in the reviewed studies are low response rates of surveys distributed to local bicycle-related businesses – a sector dominated by small, local businesses sometimes difficult to reach. Instead, an economic impact analysis should ideally be based on more reliable sales and employment data from official sources such as census data and sales tax information. The following chapter will describe the methodology used in this project, based on the findings of this review.

3 Methodology

The methodology consists of two approaches; (1) an economic impact analysis using economic data to estimate the local economic impact of the bicycle industry as well as characterizing the 2015 industry, and (2) the design and online distribution of a self-administered questionnaire regarding the perceived needs, trends, and issues of the bicycle industry aimed at owners of bicycle-related businesses in Portland. The methodology of these two approaches are described separately in this chapter beginning with the former.

3.1 The Economic Impacts of the Bicycle Industry

An estimation of the local economic impacts of the bicycle industry in Portland is carried out in three steps: (1) estimating direct economic impact using census as well as local establishment data; (2) estimating indirect and induced impacts using the IMPLAN³ economic impact analysis model; and (3) projecting future economic impacts by including data from the *City of Portland Employment Forecast by Sector* as well as historical trends. The overall approach is illustrated as a diagram in figure 2. This methodology section explains the three steps chronologically followed by a brief discussion of uncertainties and limitations to the approach but begins by unfolding the steps taken in the preceding data collection and preparation.

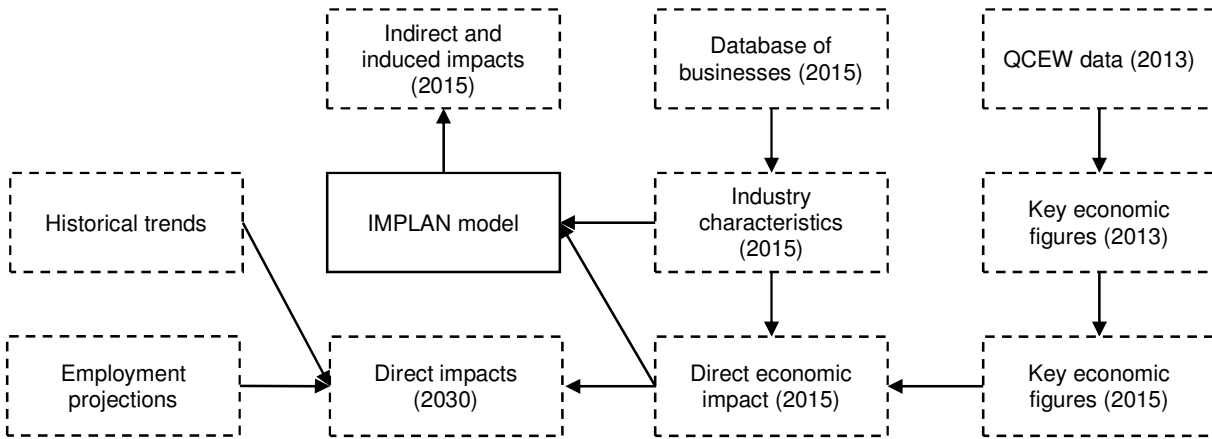


Figure 2: Diagram of the overall approach to estimating the economic impact of local bicycle-related businesses. The dashed boxes represent data and results while the solid boxes represent a method or action.

3.1.1 Data Collection and Preparation

For the estimation of the economic impact of the local bicycle industry in Portland, two primary datasets are needed; (1) a database of all relevant businesses in operation in 2015, and (2) data about employment and wages from the Quarterly Census of Employment and Wages (2002-2013). The former are used to characterize the industry in 2015, to estimate the total economic impact of the industry, and in addition will be used to select respondents to a survey and subsequent interviews (see section 3.2). The latter forms the basis for the estimation of the economic impact by delivering concrete data from which economic key figures can be extracted and then applied to the 2015 dataset as well as showing the recent development in the industry.

The database of bicycle-related businesses was built manually by the authors of this report and contains information about company name, contact information, address, and industry classification. It consists of input from three main sources: Data from a study from 2014 carried out by Dean Runyan Associates Inc. concerning the economic significance of the bicycle industry in Oregon; data collected from an online inventory of bicycle businesses in the Portland area from BikePortland.org; and a review of Google Maps' inventory of bicycle-

³ The *Impact Analysis for Planning* model managed by the IMPLAN Group LLC.

related businesses in the Portland area (Dean Runyan Associates Inc., 2014; BikePortland.org, 2015; Google, 2015). The data is reviewed manually to make sure the businesses are relevant, still in operation, and that there are no overlapping data. Then the database is divided into two categories; primary, i.e. businesses solely occupied with bicycle-related business, (retailers, manufacturers, wholesale/distribution and services businesses), and secondary, i.e. businesses partly occupied with bicycle-related business (such as sporting goods stores, big box retailers, etc.). Businesses in the last category will not be included in this study. Lastly, the database entries are geocoded in ArcGIS to make sure that they all lie within the boundaries of the City of Portland. The data collection and preparation process is illustrated as a diagram in figure 3.

The selected businesses are organized in four categories used throughout the study; manufacturing, retail (including repair and rental services), wholesale/distribution, and services (including businesses as different as tour operators, bicycle training facilities, and delivery and messenger service providers). These categories are chosen in part because they represent the four main segments of businesses in the industry, in part because similar classifications are used in the earlier versions of this study (Alta Planning & Design, 2008; Alta Planning & Design, 2006) thereby enabling comparisons. The categories are presented in table 2.

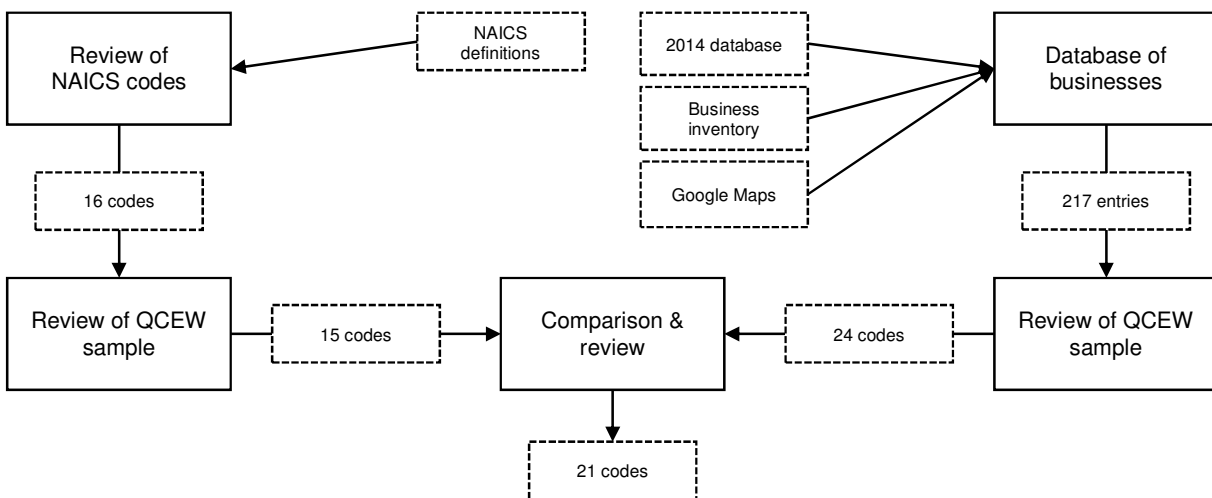


Figure 3: Diagram of the data collection and preparation process. The dashed boxes represent data and results while the solid boxes represent a method or action.

The Quarterly Census of Employment and Wages (QCEW) collects detailed information on employment and quarterly wage levels by NAICS⁴ classifications. Data is collected through quarterly filings by employers covered by the *Unemployment Insurance* program and covers 97% of employment in the United States. The dataset contains information about company name, address, average number of employees⁵, total wages, and geocodes⁶, amongst other things (Bureau of Labour Statistics, 2015a). The QCEW dataset used in this study is obtained by the Bureau of Planning and Sustainability from the Oregon Employment Department.

QCEW data for this study is extracted by NAICS classification codes and geolocation. Identifying the relevant NAICS codes is done via a two way approach. First, the list of NAICS codes with descriptions is reviewed in order to identify relevant classification codes. Secondly, NAICS codes for the individual businesses in the

⁴ North American Industry Classification System.

⁵ More precisely, the dataset provides information on the average number of jobs, since employees, occupying more than one job, will be included several times in the data. In addition, QCEW data does not cover self-employed persons or other sole proprietorships (Bureau of Labour Statistics, 2015a).

⁶ This study will not publish data that disclose individually identifiable data from the QCEW.

2015 database for bicycle industry is identified. The results of these two maneuvers are then combined to a final list, containing 21 NAICS classification codes (see table 2). Thirdly, the QCEW data is geocoded in ArcGIS to deselect those that do not lie within the boundaries of the City of Portland. Lastly, the list of businesses are manually reviewed to make sure that it only includes relevant businesses. This is necessary because the nature of the NAICS classifications does not allow for a detailed selection of bicycle businesses only. For example, most bike shops are filed under NAICS classification code 451110, i.e. ‘Sporting Goods Stores’, a segment that also includes many other kinds of shops that are not necessarily relevant for this study. In addition, since the filings are done by the individual business owners, the classification of the businesses are based on the owners’ own judgments. Hence, illogical or surprising classifications do occur. Other issues with the data source affect the results as well. These are mainly due to the characteristics of the bicycle industry, as it includes many small businesses, and include lack of reporting (informal economy) and the fact that sole proprietorships are not included in the dataset (see section 3.1.5). Therefore, manual reviews are preferred.

Table 2: Classification of sub sectors in the bicycle industry with descriptions and overview of associated NAICS codes.

<i>Classification</i>	<i>Description</i>	<i>Included NAICS codes</i>
<i>Manufacturing</i>	Manufacturing of bicycles, bicycle parts, accessories, and bicycle-related outerwear and apparel.	314910, 315220, 316998, 332812, 336991, 339920
<i>Retail</i>	Sale of bicycles, bicycle parts, accessories, and bicycle-related outerwear and apparel as well as repairs, maintenance, and bicycle rentals.	441310, 448150, 451110, 453310, 453998, 532292, 811490
<i>Wholesale/distribution</i>	Wholesale, import, or distribution of bicycles, bicycle parts, accessories, and bicycle-related outerwear and apparel.	423910, 425120
<i>Services</i>	Various services provided to bicyclists or primarily provided via bicycling, including bicycle tours and bicycle delivery.	487110, 492210, 561520, 713940, 713990, 722513

3.1.2 Estimating the Direct Economic Impact

Using a combination of key economic factors derived from the QCEW dataset extrapolated to 2015 values and the information about the characteristics of the bicycle industry in Portland from the constructed database, the direct economic impact of the bicycle industry has been estimated. The direct economic impact is the initial change in the economy due to the sector’s activity, i.e. changes in employment, wages, and sales (Deller, Hoyt, Hueth, & Sundaram-Stukel, 2009; Mulkey & Hodges, 2015). In this study, the primary data for estimating the direct economic impact is data on employment and wages from the 2013 QCEW dataset.

Aggregating the data from the selected businesses from the 21 NAICS classifications, estimates of the total employment (average employment per business throughout the year) and the total compensation paid (total compensation paid to employees in all businesses in a year) are used to calculate key economic factors for the year 2013: Two key factors per sub sector dataset representing the number of employees per business and the compensation per employee. Choosing representative factors is of course crucial and there are several approaches to do so. The most straightforward is to use the mean or median value of each dataset and apply these as the factors. This approach is discussed in the following.

Key Economic Factors

When choosing the correct key economic factors, i.e. factors that can be used to estimate employment and wage levels in 2015 based on 2013 data, the difference between median and mean values becomes significant. Hence, analyzing the distribution of data on average employment and average wage in 2013, it becomes clear that choosing either the median or the mean value as the factor gives radically different results. In table 3 the factors derived from the data are presented, showing large gaps between the mean and median values: In the case of the wage factor, the mean value is 14% higher than the median value, and the mean value is 128% higher than the median value for the employment factor.

Table 3: The mean and median values of total wage and total employment, respectively, as economic factors from the 2013 QCEW data.

	Wage factor (2013 USD)	Employment factor
Mean value	\$25,342	9.03
Median value	\$21,729	3.96

Both the factors calculated as the mean of the dataset are higher than the corresponding median values. Mean values are very representative of whole datasets but are also sensitive to outliers. Median values are not but does not in the same way as the mean value represent the breadth of a dataset. To determine the right values to use, histograms of the relevant datasets are produced (figures 4 and 5). In general, if a dataset can be said to represent a normal distribution, the mean should equal the median value. This however, is not the case here, cf. table 3. If the datasets are heavily skewed the median value are more appropriate to use while the mean value is appropriate for datasets that are close to be normally distributed.

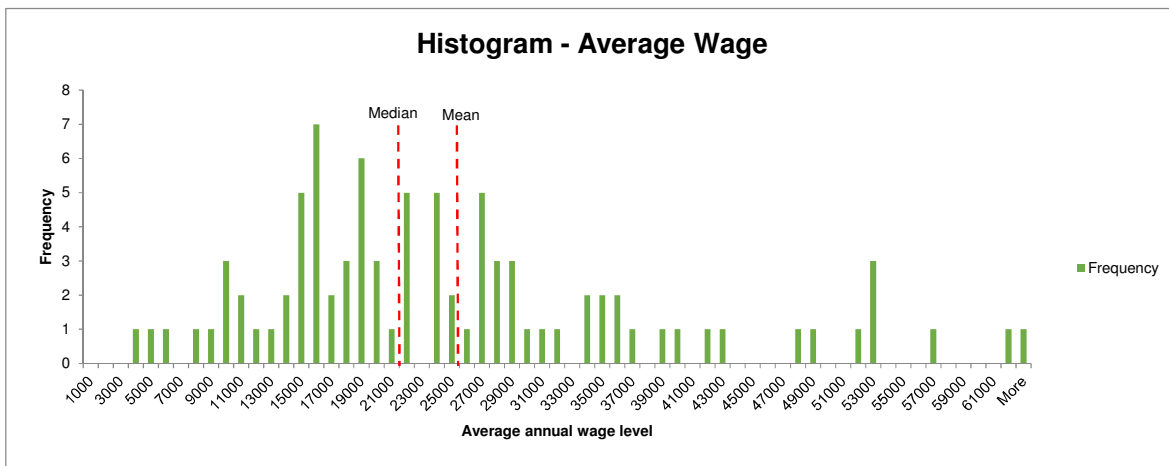


Figure 4: Histogram of the occurrences of wage levels as \$1,000-intervals of average wages. The chart resembles a normal distribution but is right-skewed.

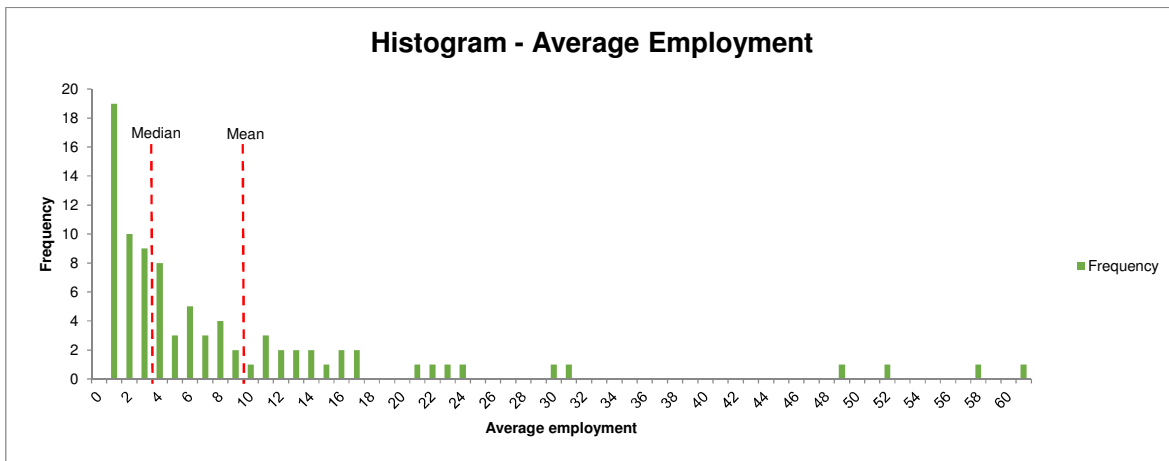


Figure 5: Histogram of the occurrences of average numbers of employees rounded off to the nearest whole employee. Unlike the distribution of wages, the distribution of average number of employees per business is very left-skewed with many outliers.

Figure 4 shows a histogram of the occurrences of different wage levels divided into \$1,000-intervals of average annual wages. The chart resembles a normal distribution but is right-skewed. Dealing with a skewed distribution the median value more appropriately represents the dataset, as illustrated on the chart. Figure 5 is a histogram of the occurrences of average numbers of employees per business rounded off to the nearest whole employee. Unlike the distribution of wages, the distribution of average numbers of employees per business is very left-skewed with many outliers, i.e. a lot of small businesses and few, in comparison, very big. Therefore, as with the average wage, the median value should represent the dataset most appropriately. As noted in the beginning of this section, these choices have great influence on the final results when applying the factors in order to estimate the 2015 impacts. This is illustrated in figure 6 where the concrete difference in results for employing the mean versus the median values as factors are shown. The charts show the different results on total employment and total wages gained by employing the mean and median employment factors, respectively. In addition, the two charts showing the total wages represent the use of the median (middle chart) and mean (right) factors for estimating the total wages.

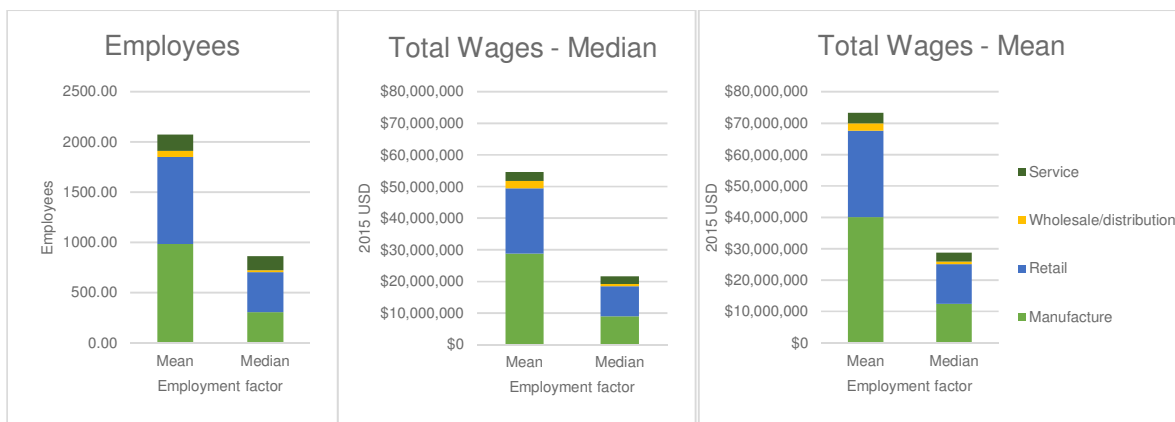


Figure 6: Three charts illustrating the different results gained by employing either mean or median values as factors, estimating the 2015 wage and employment levels based on 2013 QCEW data. Each chart shows the result of employing either the mean or median value of employment per business as a factor. The left chart shows the results on total employment. The two charts showing the total wages (middle and right), in addition, represent the use of the median (middle chart) and mean (right) values as factors for estimating the total wages.

As illustrated on the three charts, in the scenario with the most conservative estimate (factors; median wage, median employment) the industry contributes with \$21 million in wages to the local economy. Reversibly, the industry creates more than \$74 million in the most optimistic estimate (factors; average wage, average employment): An annual difference of more than \$50 million. The difference alone is not an issue but should be expected given the large gap between the mean and median values, but there might still be an issue with employing the median values as the key economic factors: Estimating 2015 values for total employment and wages using the median values produces results that are not very credible, comparing them to the 2013 base data (see table 4).

Table 4: The change in total employment and wages in comparison to the increase in businesses when employing the median values as factors to estimate 2015 employment and wages. Note that the number of businesses is the basic variable.

	Businesses	Total employment	Total wages (2013 USD)
2013 (QCEW data)	88	797.67	\$24,430,617
2015 (Database and estimates)	217	858.96	\$21,554,478
Change (2013-2015)	146.59%	8.09%	-11.77%

To assume that more than a doubling of businesses (base data) only gives rise to an increase in total employment of 8% and a *decrease* in total wages of 11%, does not seem plausible. An approach to remedy that gap

is to clean the data for outliers and thereby creating more representative mean values that can be used as economic factors. Outliers are removed separately from each dataset ('all businesses', 'manufacturing', 'retail', etc. and 'average wage' versus 'average employment') since the same business might not be an outlier in terms of employment even though it is in regards to wage levels. Outliers are identified by plotting the dataset in a chart, as exemplified in figure 7. All charts, with outliers highlighted can be found in appendix A. In total, 10 outliers are left out when calculating the economic factors.

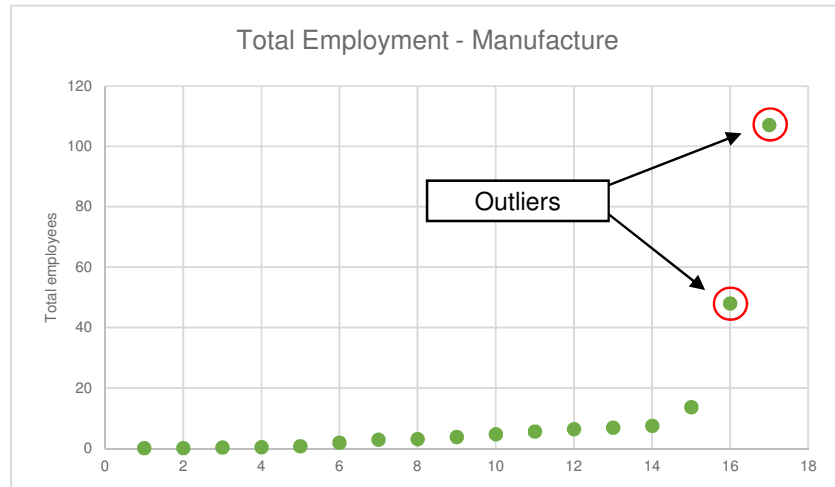


Figure 7: An example of a chart used to identify outliers in the datasets. All charts can be found in appendix A.

In table 5, the result of a comparison of different uses of economic factors is presented; 'optimistic' (original mean values), 'conservative' (original median values), and a 'cleansed' set (no outliers⁷ and mean values as the factor). In the 'optimistic' scenario, the total employment and wages follow (but outperform) the increase in businesses, which is the primary data. This is not the case with the two other scenarios where, in comparison, only slight increases in employment and total wages follow (including a decrease in total wages in the 'conservative' scenario). However, of the three, the 'cleansed' scenario seems the most plausible since it features moderate increases in both employment and wages in comparison to the increase in businesses. Hence, the key economic factors (table 6) are determined based on the cleansed dataset and will consist of the mean values for both the average employment per business and the average wage per employee per business.

Table 5: The change in total employment and wages in comparison to the increase in businesses for three different approaches; an optimistic (original mean values), a conservative (original median values – same as in table 3), and a cleansed set (no outliers, mean values).

Change (2013-2015)	Businesses	Total employment	Total wages
Optimistic	146.59%	161.07%	164.70%
Conservative	146.59%	8.09%	-11.77%
Cleansed	146.59%	84.93%	61.29%

⁷ While the outliers are removed when calculating the economic factors they are re-included when calculating the total employment impact. This is done since the size of these businesses in terms of employment are a considerable part of the total employment of the sub sector in question; the two outliers of the manufacturing sector constitutes more than 70% of the employment of the sector and 20% of total employment in the industry. Therefore, the employment numbers would be unreasonably low without the outliers, just like the economic factors would be unreasonably high with them.

Table 6: Key economic factors, average number of employees per business (employment factors) and average compensation per employee (wage factors), for the Portland bicycle industry segments derived from the 2013 QCEW data.

Classification	Employment factors	Wage factors (2013 USD)
Manufacturing	3.96	\$28,826
Retail	6.57	\$23,202
Wholesale/distribution	2.44	\$29,270
Service	5.16	\$15,939
All	7.90	\$24,254

The wage factors (table 6) are extrapolated to 2015 levels by using the Bureau of Labor Statistics' *Employer Costs for Employee Compensation* statistics to account for the change in wage levels and the Bureau of Labor Statistics' *Consumer Price Index* to adjust for inflation. The average hourly worker's compensation in 2013 of \$31.21 (average of all four quarters) has risen to \$33.49 in 2015 (first quarter only) (Bureau of Labor Statistics, 2015b). This difference of \$2.28 equals an increase in compensation of 7.32% in the period. Hence, the average compensation from the 2013 QCEW data should be increased with 7.32% to equal 2015 levels (see table 7). Finally, the inflation rate of 2.44% in the period 2013-2015, as determined by the Bureau of Labor Statistics, is applied (Bureau of Labor Statistics, 2015c). The final key economic factors are presented in table 8 as they are used in this study.

Table 7: Development in total employee compensation, 2013-2015 (2015 USD).
(Bureau of Labor Statistics, 2015b)

	March	June	Sep.	Dec.	Average
2013	\$31.09	\$31.00	\$31.16	\$31.57	\$31.21
2015	\$33.49	-	-	-	\$33.49
Difference	-	-	-	-	\$2.29
Difference (%)	-	-	-	-	7.32%

With the key economic factors converted to 2015 values they can now be applied to the database of current bicycle-related businesses (primary businesses only). Since the database is divided into the same classifications as the QCEW data, the average number of employees per business per classification (employee factors) and the average compensation per employee per classification (wage factors) can be used to estimate the total employment and employee compensation for the industry sector in 2015 as well for each sub sector.

Table 8: Key economic figures, average number of employees (employment factors) and average compensation per employee (wage factors), for the Portland bicycle industry segments derived from the 2013 QCEW data and extrapolated to 2015 values.

Classification	Employment factors	Wage factors (2015 USD)
Manufacturing	3.96	\$31,691
Retail	6.57	\$25,508
Wholesale/distribution	2.44	\$32,180
Service	5.16	\$17,523
All	7.90	\$26,665

Lastly, to increase the breadth of the results, sales estimates for the individual sub sectors are derived from 2012 Economic Census data (United States Census Bureau, 2015). The data available is broken down by 2-digit NAICS codes classifications (manufacturing, retail, service, etc.) and data for the specific sub sectors in question is not available. Hence, sales are estimated based on general industry averages. The sales estimates should therefore be considered as an approximation.

3.1.3 Estimating the Direct, Indirect, and Induced Impacts with IMPLAN

To estimate the total economic impact of the bicycle industry this study uses the input-output based economic model, IMPLAN (v3.1). By applying data derived from the 2013 QCEW dataset combined with the database of bicycle-related businesses to the model it can produce information on indirect impacts (changes in employment, sales, and wages in industries connected with the bicycle industry) and induced impacts (changes in the economy when the wages from the bicycle industry are spent) based on input about direct impacts (immediate changes in employment, sales, and wages in the industry). In addition, the model can estimate the changes in local, state, and federal taxes as a result of the change of economic activity.

The logic behind the model is that the local economy consists of an interconnected network of businesses and households that all react to or are affected by a change in one part of the economy. Hence, if the sales (outputs) of the bicycle industry increases, this will create a need for more resources (inputs), i.e. materials, services, and labor. This creates a demand in other industry sectors such as suppliers, households (for labor), legal offices, employment bureaus, real estate agencies, etc. This demand will result in an increase in revenue in these sectors that in turn will result in an increased need for labor resources. Therefore, the model estimates total changes in employment as the increase in jobs in the bicycle industry (direct impact) and the increase in jobs in the affected, connected industries (indirect impact). The relation between different industry sectors in the model is based on input-output data about sales and purchases between sectors from the Bureau of Economic Analysis. Lastly, the model assumes that the increase in total wages resulting from the increase in employment goes back in to the economy as consumption. In brief, the model thus simulates the flow of money, resources, and employment through the economy based on actual observed flows for the region in question. In order to apply figures for total employment wages and total sales of the 2015 bicycle industry in Portland to the economic impact model, the NAICS classifications used need to be translated to the classifications used by IMPLAN. The IMPLAN Group LLC, who maintains the model, provides a conversion table between their 404 industry codes and the 2012 NAICS classifications. For the IMPLAN analysis, the 21 NAICS identified thus becomes 17 IMPLAN industry codes (appendix B). The output of the IMPLAN analysis is a number of impacts expressed by the following categories: Employment (total jobs); Labor income (total employee compensations including that of self-employed persons); Total Value Added (sum of labor income, property type income, and indirect business taxes); Output (gross measure of production); Fiscal impact (local, state, and federal tax). These in combination make up the total economic impact.

3.1.4 Projection of Impacts

In order to project the future size of the bicycle industry in Portland, a scenario approach is used. Three scenarios are made; a low, medium, and high growth scenario. The low growth scenario is based on citywide trends in the sectorial distribution of employment from the Economic Opportunity Analysis (EOA) (E. D. Hovee & Company, LLC, 2012) in turn based on the 2013 metro regional forecast. The medium growth scenario use the results of the prior studies of the Portland bicycle industry (Alta Planning+Design, 2006; 2008) as well as the results of this study. Lastly, the high growth scenario is based on an extrapolation of historic QCEW data (2002-2013).

The projections will estimate the size of the industry in terms of number of businesses towards 2030, the year to which the *Portland Bicycle Plan for 2030* is oriented (Portland Bureau of Transportation, 2010) and taking point of departure in the base year 2015. For the low growth scenario, four subsectors assessed to match the four sectors of the bicycle industry defined in this study, are chosen as the basis of an extrapolation. These are identified by NAICS codes by which the forecast used in the EOA is divided. The identified sectors from the EOA are listed in table 9 along with the forecast of employment for each sector on which the projection is based.

Table 9: Extract from the City of Portland Employment Forecast by Sector data showing forecasted changes in total employment per sector. Note that the base year has been changed from 2010 to 2015 (E. D. Hovee & Company, LLC, 2012).

Sub sectors	Forecast classification		Forecast Employment			
	NAICS	Sector	2015	2020	2025	2030
Manufacturing	31-33	Manufacturing	27,195	27,118	26,391	25,353
Wholesale/distribution	42	Wholesale Trade	20,529	21,810	22,574	23,010
Retail	44-45	Retail Trade	34,515	34,139	33,855	33,593
Service	71	Arts, Entertainment & Recreation	6,985	7,668	8,152	8,429

Unlike the low growth scenario, the medium and high growth scenarios are bases extrapolations of historic trends in the bicycle industry. The medium growth scenario thus builds on the results of available studies on the size of the industry in Portland. These results are used to calculate an average annual growth rate (AAGR) for the period 2006-2015 which in turn is applied to the forecast period 2016-2030. The basis of the projection is thus an industry size of 95 businesses in 2006, 143 businesses in 2008, and 217 in 2015. Similarly, the high growth scenario use historic QCEW data from the period 2002-2013 to calculate an AAGR for the period which is extrapolated. The three AAGR representing the three scenarios are presented in table 10.

Table 10: Calculated AAGRs for the low, medium, and high growth scenarios based on EOA projections, prior studies of the industry, and QCEW data, respectively.

	Low	Medium	High
AAGR	-0.02%	8.15%	12.97%

As the AAGRs show, the scenarios will have radically different impacts on the projection of the size of the bicycle-industry in 2030. From the low growth scenario that projects a stagnation of the industry size to the high growth scenario that projects an almost 13% annual increase in the number of businesses towards 2030. How likely each scenario is, is subject to discussion. Since the projection of the bicycle industry in the low growth scenario builds entirely on the employment forecast it does not reveal anything about sub sector specific growth rates, i.e. it is not sensitive to specific development patterns in the bicycle industry itself. Therefore, it can only be used to reveal the possible extent of the sector assuming it follows general expected development patterns. The medium growth scenario offers industry specific growth rates building on historic trends but the forecast is based on a limited amount of data (three inputs) and a short period (2006-2015). The high growth scenario also offers industry specific growth rates based on QCEW data. The annual growth rates in the period observed are quite extraordinary, however, in part showing signs of an industry segment in rapid development. The main reason for the high growth rates seems to be the generally low starting points. As an example, both the wholesale/distribution and service sub sectors, the sectors with the highest annual growth rates, increase from consisting of two businesses in 2008 to five and nine in 2013, respectively. Therefore, to expect these growth rates to continue might be overly optimistic. Assuming continued commitment to bicycling in Portland the medium and high growth scenarios are perceived as most plausible.

3.1.5 Uncertainties and Limitations

The methodology presented in this chapter has been shaped by external factors such as the availability and quality of data. In addition, several important choices have been made that influence the results of the analysis. In this section the central uncertainties related to the results of the analysis are discussed in order to highlight certain limitations to this study's methodology. These uncertainties are related to the nature of the primary data, the 2013 QCEW; the calculation of economic factors; and the estimation of total sales in the bicycle industry.

Table 11 shows the sectorial distribution of businesses in the 2013 QCEW dataset and the database of bicycle-related businesses, respectively. Comparing the sectorial distribution in the two datasets, four observations can be made; (1) the number of businesses in each sector are much higher in the database than in the QCEW data (perhaps with the exemption of the wholesale/distribution sector), (2) the share of wholesale/distribution and service businesses are to a large extent comparable, (3) there is an overrepresentation of retail businesses in the QCEW dataset, and (4) there is an underrepresentation of manufacturing businesses in the QCEW dataset. Keeping in mind that the QCEW data is from 2013 and the database is representing the situation in 2015 as well as the difference in origin of the data (one from census data and one from a manually collected database), differences are to be expected. However, the overall increase in businesses throughout the industry, and the relative increase in manufacturing businesses and comparable decrease in retail businesses seem drastic in the short period. This, however, can to a large extent be explained by the properties of the QCEW data.

Table 11: Sectorial distribution of businesses in the 2013 QCEW dataset and the 2015 database of bicycle-related businesses, respectively.

<i>Total amount of businesses</i>	<i>QCEW (absolute)</i>	<i>QCEW (percent)</i>	<i>Database (absolute)</i>	<i>Database (percent)</i>	<i>Difference (percent point)</i>
<i>Manufacturing</i>	17	19.32%	78	35.94%	-16.62%
<i>Retail</i>	57	64.77%	100	46.08%	18.69%
<i>Wholesale/distribution</i>	5	5.68%	8	3.69%	1.99%
<i>Service</i>	9	10.22%	31	14.29%	-4.07%
<i>Total</i>	88	100.00%	217	100.00%	-

The nature of the QCEW data entails a number of uncertainties in the dataset. The sources of uncertainty in the data relevant for this study derives mainly from (1) the method used to collect the data, self-filing, and (2) the fact that the QCEW does not include data about self-employed persons or other sole proprietorships. The second source of uncertainty potentially has a great impact on the number and sectorial distribution of businesses represented in the QCEW dataset since many of the newer businesses in the bicycle industry are small sole proprietorships. This can explain the underrepresentation of manufacturing businesses, many of which, a review shows, are small one-man enterprises. However, the fact might also explain missing businesses across the sectors.

The first source of uncertainty could affect the data in several ways. First of all, as mentioned earlier, the self-filing can give rise to mistakes in classification which can result in businesses not being included due to illogical classifications. Secondly, some small businesses may (knowingly or unknowingly) fail to report data to the Bureau of Labor Statistics. Thus, the fact that the industry is dominated by relatively small companies constitutes a limitation to the methodology in which QCEW data is essential.

In the calculation of the key economic factors used to estimate employment and wages in 2015 based on 2013 QCEW data several choices were made that greatly influence the results. Section 3.1.2 highlights the radically different results different approaches to calculating the factors entails. As table 5 in that section illustrates, choosing the conservative, optimistic, or cleansed scenario have significant impacts on the number of employees and total compensation paid in the bicycle industry. The chosen scenario, the 'cleansed' where outliers are removed in the calculation of the factors, can be described as a middle ground between the optimistic and the conservative scenarios. However, even the cleansed scenario seems conservative when comparing the change of employees and compensation to the increase in businesses. The optimistic scenario might be implausible but more significant results than the ones the cleansed entails are plausible. Therefore, the results of the study should be considered as a conservative estimate.

In order to calculate the total economic impact of the bicycle industry, the IMPLAN model needs inputs about both employment and sales of the industry. However, the QCEW data does not include data about sales of the businesses and in general sales data for industry segments are not accessible due to privacy reasons. Therefore,

estimations of the sales of the sub sectors were made using data from the Economic Census. Even though this data is of high quality it only grants access to aggregated data on 2-digit NAICS level which is not detailed enough for this study. Being the only accessible data, sales estimates have been made assuming that the average sales for a business within a sector can be applied to the bicycle industry. The sales of an average bicycle manufacturer is thus the same as the average sales of any given manufacturer in Portland. This approach gives a very crude sales estimate and cannot be considered as being accurate but the results of the maneuver has been reviewed and considered to be plausible. However, the lack of accurate sales data is a considerable limitation to the validity of the results of this study.

Table 12: Overview of the sources of uncertainties including presumed effects on the results.

<i>Uncertainty</i>	<i>Description</i>	<i>Effect</i>
<i>QCEW data</i>	Properties of the QCEW data gives rise to uncertainties in the data set for this study, e.g. self-filing and the fact that sole proprietorships are not included.	Will push the result in a conservative direction.
<i>Calculation of economic factors</i>	Economic factors are calculated as the average values of employment and wage per business, respectively, without outliers.	Will push the result in a conservative direction.
<i>Sales estimates</i>	In estimating the sales of the bicycle industry, data about average sales in general industry groups was used.	Unknown

In general, the choices made in designing the methodology of this study gives rise to several uncertainties that to an extent impose limitations to the validity of the results. However, the choices made have consistently tried to adjust for these uncertainties. As table 12 illustrates, two of the three major sources of uncertainties in this study are considered to push the results in a conservative direction. It is not known in which direction the estimation of sales for the sub sectors influence the final results. In conclusion, the results of the economic impact analysis should be seen as a conservative estimate and should be viewed in the light of all the above mentioned limitations and uncertainties.

3.2 The Perceived Needs and Trends of the Bicycle Industry in Portland

The second part of the study aims to uncover the perceived needs and trends of the bicycle industry in Portland complementing the results of the economic impact analysis. The main objectives of this part of the study is to (1) complement the characterization of the industry made in the economic impact analysis based on data analysis, (2) rank the importance of different factors for the bicycle-related businesses, (3) uncover the perception of Portland in regards to these factors, (4) and get a more nuanced view of the issues the industry face through a more qualitative approach. The approach involves reaching out to local businesses mainly through an online self-administered questionnaire combined with follow-up interviews.

3.2.1 Questionnaire Design

The method of online self-administered questionnaire is chosen in order to reach the largest amount of businesses. A survey sample is extracted from the 2015 database of bicycle businesses in Portland. The sample size is 90 businesses including businesses from all the four sub sectors of the industry; manufacturing, retail, wholesale/distribution, and service. The distribution between these sectors for the sample, the 2013 data from the Quarterly Census of Employment and Wages (QCEW), and the 2015 database is presented in table 13. It shows that the representation of businesses from the different sub sectors in the survey sample are fairly close to the distribution in the 2015 database and that manufacturing is overrepresented and retail underrepresented compared to the distribution in the 2013 QCEW data. Since the 2015 database should reflect the most recent representation of the bicycle industry, a close resemblance to its distribution among sub sectors is preferred.

Table 13: Comparison of the representation of the four sub sectors in the survey sample, 2013 QCEW data, and the 2015 bicycle industry database. The 'difference' columns show the difference in percent points between the distribution in the sample and the datasets.

	Sample		QCEW, 2013		Difference (pp)	Database, 2015		Difference (pp)
Manufacturing	29	32.22%	17	19.32%	12.90%	78	35.94%	-3.72%
Retail	44	48.89%	57	64.77%	-15.88%	100	46.08%	2.81%
Wholesale/distribution	6	6.67%	5	5.68%	0.98%	8	3.69%	2.98%
Service	11	12.22%	9	10.23%	1.99%	31	14.29%	-2.06%
Total	90	100.00%	88	100.00%	0.00%	217	100.00%	0.00%

The questionnaire was designed in the online platform SurveyXact (maintained by Ramboll Group) and distributed by direct email contact. A copy of the questionnaire can be found in appendix C. The questionnaire was accessible online for two weeks from the 16th of September to the 30th of September 2015 and in the period one follow-up email was sent. In total, 45 responses were received of which 34 were completed. However, 2 respondents did not meet the requirements of the study (located in Portland and part of the bicycle industry). Hence, the study is based on the answers from the 32 respondents which equals a response rate of 35% (table 14). While the sectorial distribution of the respondents corresponds fairly well with the distribution in the sample no wholesale/distribution businesses are represented. Instead, three respondents classified themselves as "Other". They elaborated their response classifying their businesses as design, bike rental, and direct sales of manufactured goods, respectively. In addition to the questionnaire, a few short interviews were conducted with respondents in order to expand on the answers given in the questionnaire.

Table 14: Number and sectorial distribution of respondents to the online questionnaire. While the sectorial distribution of the respondents corresponds fairly well with the distribution in the sample no wholesale/distribution businesses are represented.

	Sample		Respondents		Share of sample
Manufacturing	29	32.22%	8	25.00%	27.59%
Retail	44	48.89%	13	40.63%	29.55%
Wholesale/distribution	6	6.67%	0	0.00%	0.00%
Service	11	12.22%	8	25.00%	72.73%
Other	0	0.00%	3	9.38%	0.00%
Total	90	100.00%	32	100.00%	35.56%

A response rate of 35% in an online-distributed self-administered questionnaire can be considered acceptable. However, the low absolute number of respondents does impose limits on the generalizability of some of the findings. This is especially true for the results divided by the basic variables, sub sector classification (manufacturing, retail, wholesale/distribution, service, or other) and size of the business in terms of the number of employees (sole proprietorship, less than 5, 5 to 10, or more than 10). Thus, the results cannot say anything significant about the difference in answers between industry sectors or business sizes. In general, the results of the questionnaire should be regarded as a qualitative input rather than quantifiable data.

4 Economic Impacts of the Bicycle Industry

In September 2015, the bicycle industry consisted of 217 businesses, mainly retail businesses (100) and manufacturers (78). The industry also includes a service segment (31) and a wholesale/distribution segment (8). The retail segment of the industry mainly consists of neighborhood bicycle shops, many including repair facilities, but also includes accessories and apparel retailers and dealers of specialized outerwear. The manufacturing segment consists mainly of small businesses manufacturing bike frames, specialized parts, accessories, or apparel and outerwear. Contrary to the first two sectors described, the service segment includes a wide range of different kinds of businesses providing services for bicyclists or via bicycling. This sector thus includes fitness training for bicyclists, tour operators, tourist services, delivery by bike, and more. Lastly, the businesses in the wholesale/distribution segment often combines wholesale and/or distribution with a physical retail component.

The bicycle industry is estimated to support 1,469 jobs in 2015 with almost 800 of those in the retail segment and approximately 460 in the manufacturing segment. Observing the internal distribution of businesses, employment, and compensation (figure 8) it is evident that retail businesses account for a disproportionately large share of total employment and compensation while the service businesses accounts for a disproportionately small share. Both wholesale/distribution and manufacturing have disproportionately few employees but accounts for a larger share of the total compensation.

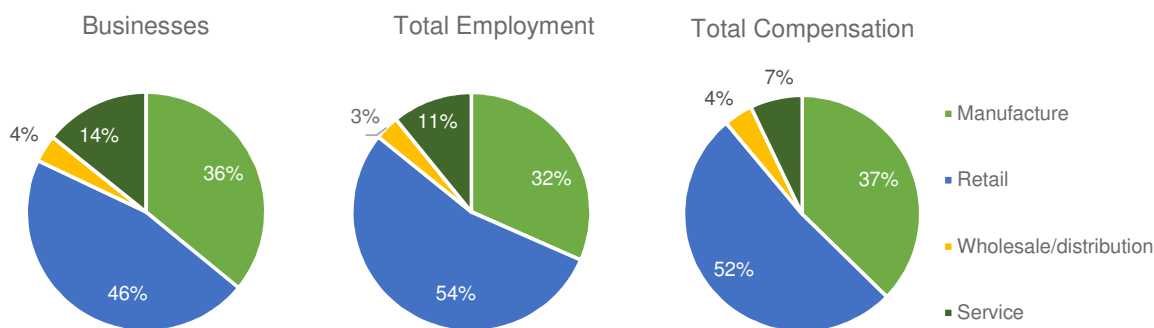


Figure 8: Composition of the bicycle industry in 2015 expressed as the number of businesses (left), the number of employees (middle), and the total compensation paid (right), all divided by sub sector. The data is from the assembled database combined with 2013 QCEW data.

The direct economic impact of the bicycle industry can be expressed by its total sales and the total compensation paid to the 1,469 employees of the industry. An overview of the key figures for the Portland bicycle industry in 2015 is presented in table 16. In total, \$39.4 million are paid in compensation of which more than half can be attributed to the retail sector (\$20.3 million) followed by the manufacturing sector (\$14.7 million). Total sales in the industry are estimated to almost \$300 million, dominated by manufacturing sales (\$120 million) and wholesale/distribution transactions (\$108 million), despite the latter's modest size. The large share held by the wholesale/distribution sector is due to the fact that businesses included in the sector can be expected to have a large turnover, buying and selling large amounts. If the data included revenue instead of sales, the share would be expected to be significantly lower.

Table 15: Characteristics and key figures of the Portland bicycle industry in 2015, including number of businesses, total employment, total compensation paid, and estimated sales, divided by the four sub sectors. The data is from the assembled database combined with 2013 QCEW data.

2015	Businesses	Total employment	Total compensation	Estimated sales
Manufacturing	78	464.13	\$14,708,951	\$120,906,425
Retail	100	796.79	\$20,324,543	\$36,566,149
Wholesale/ distribution	8	48.75	\$1,568,768	\$108,060,609
Service	31	159.88	\$2,801,588	\$30,696,636
Total	217	1,469.55	\$39,403,849	\$296,229,820

In order to further understand the basic characteristics of the bicycle industry it is helpful to return to the 2013 QCEW data, the newest data at the time of writing. From the data, information about the composition (sub sector distribution) and size of the industry in 2013 can be extracted. The two main datasets from the QCEW data of interest here regards employment and compensation. The disjuncture between average and median values can show several interesting properties of the industry. While the same values are available for 2015, these are derived from the primary 2013 data and do not contain the same depth, why the 2013 values are preferred for the following points.

Table 16 shows the average and median employment and compensation, respectively. The size of the gaps between the average and median values shows that several businesses represents outliers in the dataset (a point also put forward in the methodology chapter). Observe the values for the manufacturing sub sector; the average number of employees is 12.62 but the median value only 3.92. Likewise, the average compensation is \$37,500, however the median compensation is only \$29,200. This shows that the manufacturing sector contains one or more large companies that employ more than most businesses in the sector and that also pays more in total compensation than most businesses in the sector. The same trends are true for the industry as a whole but vary between sub sectors: Average and median compensation values are fairly balanced for the retail sector in which a large gap between average and median employment are present; the median compensation outdo the average value for the wholesale/distribution sector meaning that a few businesses pay disproportionately small compensations in comparison to the sector in general.

Table 16: Characteristics of the 2013 bicycle industry from QCEW data. Note that these are not the values used to estimate the 2015 values but rather the crude 2013 QCEW data (\$2015).

2013 – 2015 USD	Businesses	Average employment	Median employment	Average compensation	Median compensation
Manufacturing	17	12.62	3.92	\$37,588	\$29,238
Retail	57	8.68	4.00	\$25,508	\$23,796
Wholesale/distribution	5	7.80	2.42	\$32,180	\$39,194
Service	9	5.16	4.42	\$21,993	\$17,137
Total	88	9.03	3.96	\$27,861	\$23,889

Figure 9 presents a map that illustrates the spatial distribution of the businesses⁸ identified in the 2015 database of the bicycle industry. There is a strong presence of bicycle-related businesses in the central city area with strong concentrations of manufacturers in and around the Central Eastside Industrial District, the Northwest Industrial District and Lower Albina. A strong presence is also observed in the Southeast, North and Northeast Portland along established commercial corridors, e.g. along Sandy Boulevard in Northeast. There is a striking low concentration of bike business east of I-205, though the Outer Rim Bike Shop and Rosewood Bikes provide maintenance and retail services to East Portland residents. Plans for improving the bikeability of the area could prove an opportunity for bicycle-related business development in the area.

⁸ For several of the businesses it was not possible to obtain an address or geolocation.

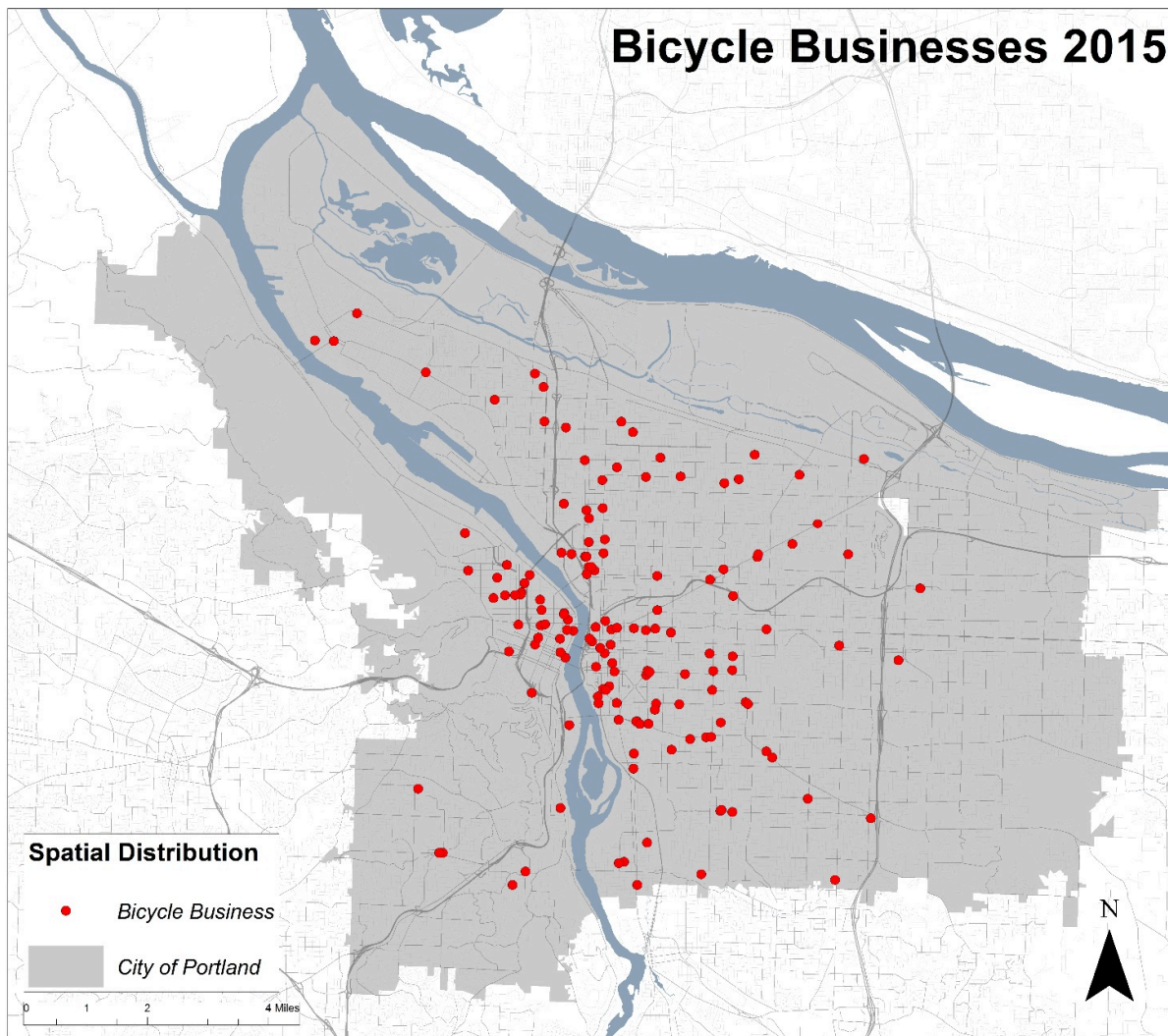


Figure 9: Spatial distribution of bicycle businesses, 2015. Entries represent all the businesses in the 2015 database of the bicycle industry in Portland for which an address or geolocation was available.

Figure 10 shows a map of the spatial distribution of the different sub sectors of the bicycle industry. Rather surprisingly, it does not seem like there are any strong patterns of spatial distribution linked to sectors beyond manufactures in Portland's industrial districts. Retail businesses (blue), being the most prevalent sector in the industry, cover all the inner neighborhoods well. The few wholesale/distribution businesses (yellow) are dispersed from Southwest to Northeast. Service businesses (dark green) seems to be mostly concentrated in the central city and the Northeast. Manufacturers (light green) are clustered in the Central Eastside Industrial District, but also dispersed in the rest of the city (west of I-205). Maps showing the spatial distribution for individual sectors can be found in appendix D.

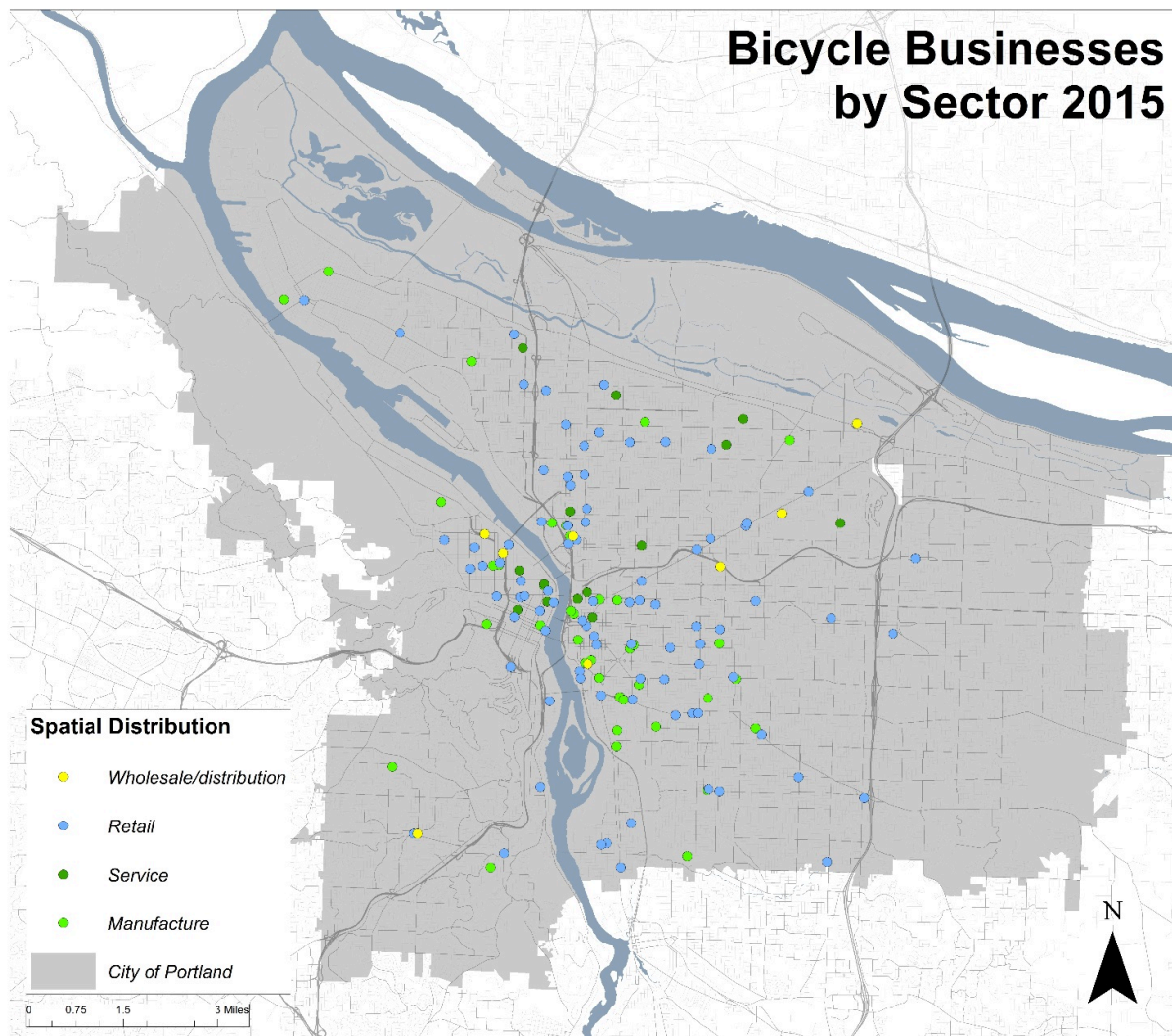


Figure 10: Spatial distribution of bicycle-related businesses by sector, 2015. Entries represent all the businesses in the 2015 database of the bicycle industry in Portland for which an address or geolocation was available.

4.1 Results of the IMPLAN Analysis

In the previous section the direct economic impacts of the bicycle industry, i.e. the total employment, wages, and sales, were presented as they have been estimated based on the 2013 QCEW data combined with the 2015 database of the Portland bicycle industry. This section will in depth describe the economic impact of the bicycle industry based on results from the economic impact analysis carried out by applying the direct economic impact to the IMPLAN economic model. The results include the indirect, induced, and fiscal impacts on the local economy, in addition to the direct impact.

A summary of the results of the IMPLAN analysis is presented in table 17. The results are expressed by four categories; employment, labor income, total value added, and output. The impact in each category are divided by impact types, i.e. direct, indirect, and induced impacts, as described above. Hence, the combination of these impacts constitutes the total economic impact of the bicycle industry. The analysis shows that the bicycle industry directly contributes with over 1,500 jobs in Portland but that its economic activity indirectly contributes with an additional 390 jobs. In total, the bicycle industry supports 2,300 jobs in Portland in 2015.

These jobs generate a total income in labor compensations of \$82.75 million annually. The measure ‘Total Value Added’ consists of labor income, property type income, and indirect businesses taxes collected and can also be termed the gross regional product, enabling comparison with the familiar gross domestic product. In other words, the total value added is a measure for how much the industry contributes to the local economy. The total value added by the bicycle industry is calculated to \$133.7 million annually of which slightly less than half derives directly from the industry and about \$70 million from indirect and induced impacts. The total output, on the other hand, is a measure for the production of the businesses and can be compared to total sales. The IMPLAN analysis appraise the total output of the industry to \$315.5 million.

Table 17: Summary of the results of the IMPLAN analysis showing employment, labor income, value added, and total output divided by direct, indirect, and induced impacts (\$2015).

Impact Type	Employment	Labor Income	Total Value Added	Output
Direct Effect	1,469.6	\$37,213,834	\$63,955,055	\$187,957,819
Indirect Effect	391.1	\$24,163,210	\$35,028,565	\$67,915,586
Induced Effect	451.7	\$21,372,987	\$34,734,151	\$59,600,699
Total Effect	2,312.4	\$82,750,031	\$133,717,772	\$315,474,104

IMPLAN also allows for analysis of how the impacts breaks down across industry sectors. A list of the 10 industries with the highest number of employees in the industry (table 18) can help to illustrate the most essential or economically influential sectors in the bicycle industry.

Table 18: Top ten industry sectors in the bicycle industry, by employment. Direct, indirect, and induced impacts aggregated.

Description	Total Employment
Retail Stores - Sporting goods, hobby, book and music	263.3
Fitness and recreational sports centers	188.7
Motorcycle, bicycle, and parts manufacturing	141.0
Wholesale trade businesses	138.2
Scenic and sightseeing transportation and support activities for transportation	128.2
Couriers and messengers	116.9
Food services and drinking places	93.9
Real estate establishments	56.0
Men's and boy's cut and sew apparel manufacturing	42.2
General and consumer goods rental except video tapes and discs	34.1

The break down is not surprising; 9 out of 10 of the industry sectors in the top ten list are primary sectors in the bicycle industry, i.e. sectors found to contribute directly to the industry's economic activity. Only ‘Real estate establishments’ is a result of indirect and induced impacts, providing services for businesses looking for commercial space as well as for house seeking employees of the industry and the sectors that is effected by the industry. Nor is it surprising to find that the industry sector which contributes with most jobs is the retail stores, which includes bicycle shops. However, that the ‘Fitness and recreational sports centers’ sector is number two on the list, and that the ‘Wholesale trade businesses’ and ‘Motorcycle, bicycle, and parts manufacturing’ (the latter encompassing the whole bicycle manufacturing sector) is comparable in size with regard to employment is fairly surprising. Especially if the results of the analysis of the 2015 database of the bicycle industry is taken into account where retail and manufacturing are the largest industry sectors by far, accounting for 85% of the jobs in the bicycle industry.

Table 19: Federal and state and local tax generation from the Portland bicycle industry as well as indirect and induced impacts of the industry.

<i>Fiscal impact</i>	<i>Total taxes</i>
<i>Federal taxes</i>	\$16,963,161
<i>State and local taxes</i>	\$9,986,308
<i>Total fiscal impact</i>	\$26,949,469

Lastly, IMPLAN provides information on the fiscal impacts of the bicycle industry providing a breakdown of the federal, state, and local taxes generated by the industry through its direct, indirect, and induced impacts. Federal taxes account for most of the total impact with \$16.9 million out of \$26.9 million. The state and local taxes amount to \$10 million. The majority of the state and local tax generation derives from property taxes as well as income taxes. The federal tax generation stems primarily from the social insurance tax but also personal income taxes and corporate profit tax.

4.2 Additional Economic Activity

As described in the methodology chapter, this study only includes 'primary' bicycle businesses, i.e. businesses that primarily are engaged with the production, sale, or service of bicycles or bicycle accessories, apparel or outerwear, or are primarily occupied with servicing bicyclists. In that way, the study's findings are related only to the bicycle *industry* but at the same time it ignores important parts of the bicycle *economy*. A recent study prepared for the National Bicycle Dealers Association shows that the primary bicycle industry represents only 50% of the sales of bicycles (measured in Dollars – in units sold it is less than 10%) and that a large part of the bicycles are instead sold through general sporting goods stores (9%), discount or big box stores (31%), and outdoor specialty retailers (7%) (Gluskin Townley Group, 2015). These statistics are national aggregates and it is unsure whether the same distribution can be found in Portland. However, it means that the retail sales estimated in this report of \$36.5 million potentially only accounts for 50% of the bicycle sales. This would mean a total retail sale of \$73 million resulting in total sales of the industry amounting to \$332 million, not counting the additional jobs and wages that would be included in the bicycle economy.

4.3 Historic Development of the Bicycle Industry

Census data from the Quarterly Census on Employment and Wages shows that the bicycle industry has grown rapidly since the beginning of the 2000s. Data from 2002 to 2013 (excluding years 2004 and 2007 for which data could not be obtained) shows that the industry in the period grew from consisting of 22 businesses in 2002 to 88 businesses in 2013. In the same period the total employment has grown from almost 250 employees to around 800 with more than a doubling of the largest employment segment, retail. Historically the industry has been dominated by the retail segment but the manufacturing segment has increased greatly from two businesses and four employees to an all-time high in 2011 with 16 businesses and 230 employees. In 2013, the manufacturing segment consisted of 17 businesses and 214 employees. The service and wholesale/distribution segment has historically consisted of between 0 and 2 businesses with few employees but developed slowly around 2010 to include more businesses and around 20 employees in total in each sector. In 2013, the segments were still small with five wholesale/distribution businesses with 39 employees and nine service businesses with 46 employees. The development in the sector is illustrated in terms of employment and number of businesses in figures 11 and 12. Both charts illustrate the historic domination of the retail segment of the industry but also how the manufacturing segment is slowly catching up. It appears also that the manufacturing segment takes up a proportionally larger part of the total employment than the other sectors, and that it be the opposite in regards to the service segment.

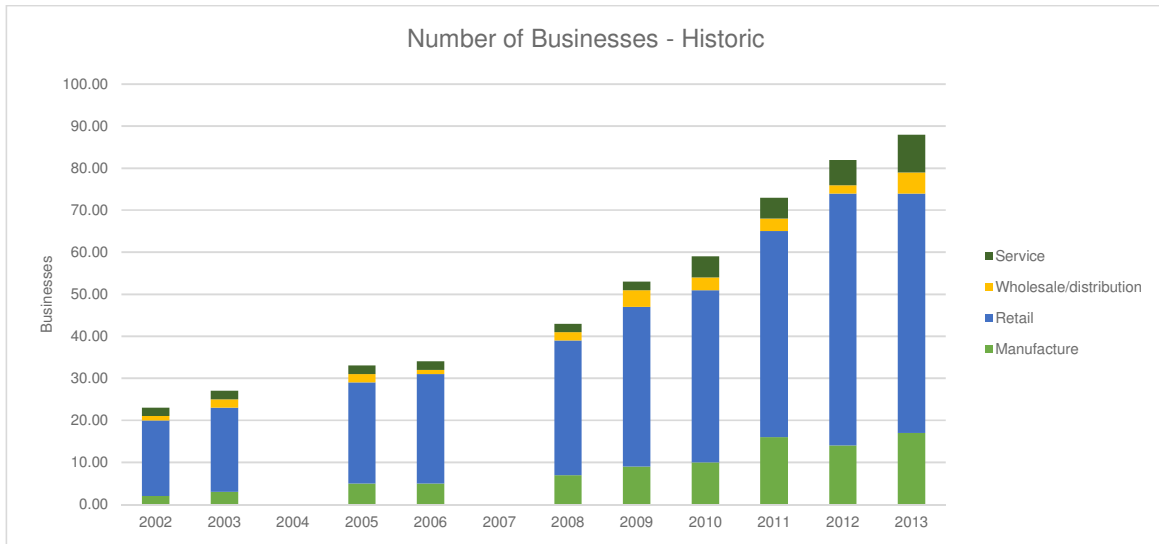


Figure 11: Historic development in the number of bicycle-related businesses in Portland, 2002-2013, based on QCEW data. Data for the years 2004 and 2007 could not be obtained.

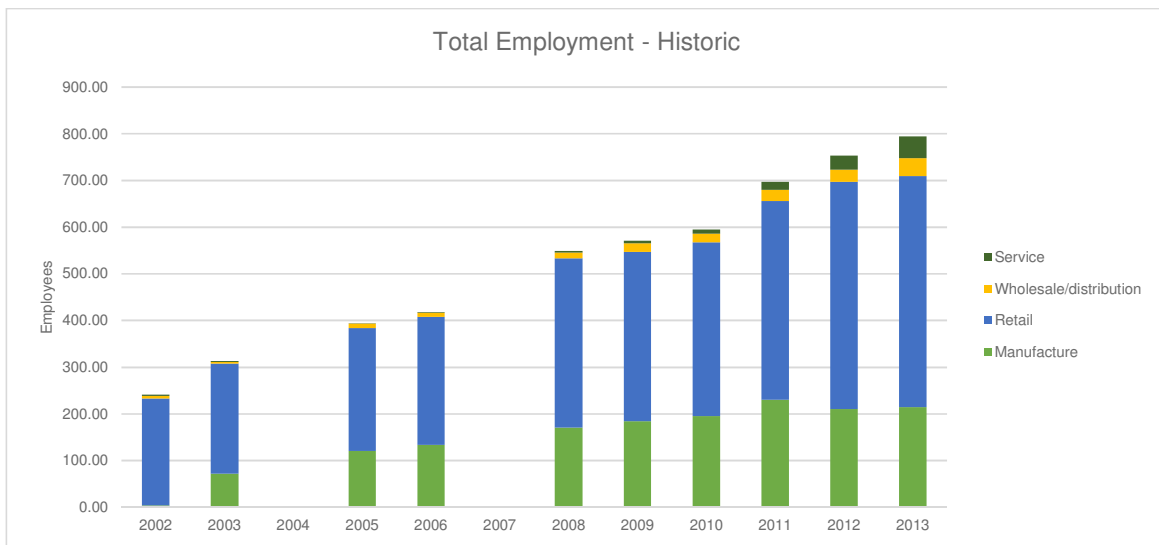


Figure 12: Historic development in the employment in the bicycle industry in Portland, 2002-2013, based on QCEW data. Data for the years 2004 and 2007 could not be obtained.

While the development in the number of bicycle-related businesses seems to grow almost exponentially the development in employment seems to have grown linearly. Looking at the annual growth rates divided by sub sector (table 20), it becomes clear that there are great differences internally in the industry. For instance, high growth rates for both number of businesses and employment can be observed in the wholesale/distribution and services sectors. However, while the number of businesses some years increases between 50% and 150% in these sectors, other years they stagnate at 0% growth or even decrease by 25%. These high and fluctuating growth rates are a symptom of the low starting point for these sub sectors. As mentioned above, the wholesale/distribution and services sectors consisted of only a few businesses up until 2010 which means that small (absolute) increases in businesses results in large increases in percentages. The fluctuations in the manufacturing and retail sectors are smaller and more consistent showing signs of larger and more established sub sectors. However, these sectors also exhibit impressive growth rates, mainly between 5% and 20%. Across the industry,

average annual growth rates of 12.97% in the number of businesses and 11.45% in the number of employees are observed underlining the industry as an economic segment in great development in the period.

Table 20: Annual growth in the bicycle industry and each of its sub sectors (businesses and employment) in the period 2002-2013.

Period	Total		Manufacturing		Retail		Wholesale/distrib.		Service	
	Bus.	Emp.	Bus.	Emp.	Bus.	Emp.	Bus.	Emp.	Bus.	Emp.
2002-2003	17.39%	29.93%	50.00%	1642%	11.11%	2.80%	100.00%	-32.31%	0.00%	-36.67%
2003-2004	11.11%	12.98%	33.33%	33.07%	10.00%	6.00%	0.00%	68.18%	0.00%	2.63%
2004-2005	10.00%	11.49%	25.00%	24.85%	9.09%	5.66%	0.00%	40.54%	0.00%	2.56%
2005-2006	3.03%	6.06%	0.00%	10.92%	8.33%	4.08%	-50.00%	-0.96%	0.00%	5.00%
2006-2007	13.24%	15.57%	20.00%	13.99%	11.54%	16.00%	50.00%	23.79%	0.00%	28.57%
2007-2008	11.69%	13.47%	16.67%	12.27%	10.34%	13.80%	33.33%	19.22%	0.00%	22.22%
2008-2009	27.91%	3.98%	28.57%	7.59%	18.75%	0.25%	100.00%	47.37%	0.00%	69.70%
2009-2010	7.27%	4.22%	11.11%	6.24%	7.89%	2.41%	-25.00%	-2.68%	150.00%	92.86%
2010-2011	23.73%	17.25%	60.00%	17.80%	19.51%	14.38%	0.00%	29.82%	0.00%	98.15%
2011-2012	12.33%	8.05%	-12.50%	-8.79%	22.45%	14.44%	-33.33%	8.83%	20.00%	72.43%
2012-2013	7.32%	5.46%	21.43%	2.06%	-5.00%	1.61%	150.00%	51.95%	50.00%	50.95%

4.4 Future Development of the Bicycle Industry

It In order to make projection of the future size of the bicycle industry in Portland, three scenarios for the industry's development in terms of number of businesses have been set up. A low growth scenario building on citywide trends in specific sub sectors of the local economy, a medium growth scenario building on historic trends in the industry based on results of prior studies (Alta Planning+Design, 2006; 2008), and a high growth scenario based on historic QCEW data from 2002-2013. The result of the projections based on the three scenarios are presented in figure 13. While the low growth scenario projects a stagnation in the number of bicycle-related businesses, the medium and high growth scenarios show substantial increases. The medium growth scenario projects more than a tripling of the number of businesses towards 2030, and the high growth scenario almost a sevenfold increase to 1350 businesses.

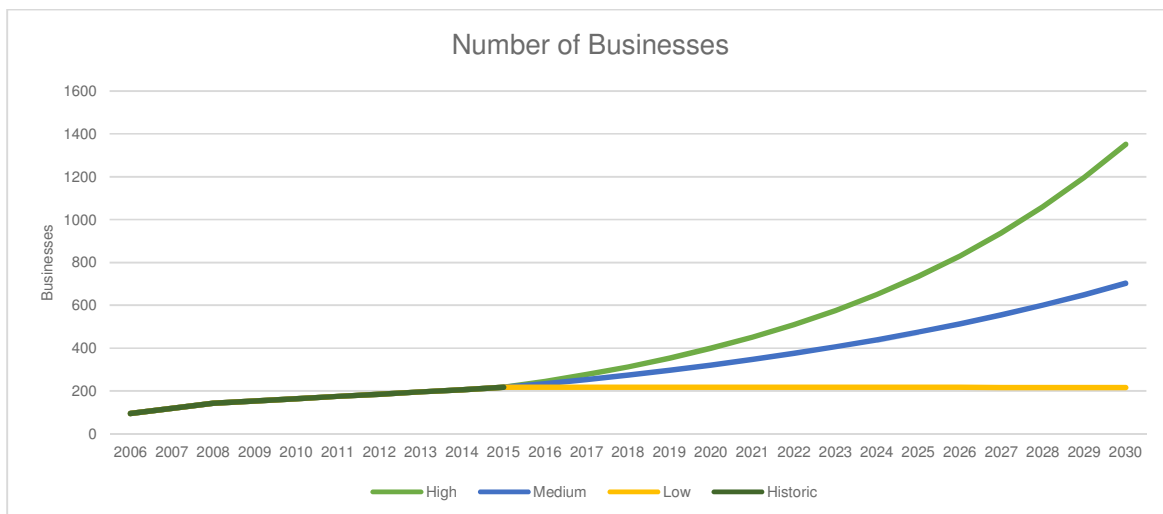


Figure 13: Three scenarios of development in the bicycle industry expressed as the of number of businesses; low, medium, and high growth. The historic data (dark green) is from the 2006 and 2008 studies and including the result of this study. While the low growth scenario (yellow) is built on citywide trends (E. D. Hovee & Company, LLC, 2012), the medium growth scenario is an extrapolation of historic trends based on results of the prior studies of the industry (2006-2015) and the high growth scenario is an extrapolation of historic trends based on QCEW data (2002-2013). The medium growth scenario is considered most plausible with the low growth scenario underestimating the growth and the high growth scenario overestimating it.

Making projections is associated with uncertainties and despite the sound basis of the forecasts external factors are crucial in the future size of the industry. Observing the historic trends, the low growth scenario are perceived as underestimating the future size of the industry and a growth in the industry should be expected. The high growth scenario projects almost 1,400 bicycle-related businesses in 2030. This development assumes a continuation of the growth patterns which the industry has shown since its early stages in the beginning of the century, i.e. the growth patterns of a newly established industry. Given the industry's relative consolidation in recent years, this projection is considered as optimistic. Lastly, the medium growth scenario projects a substantial increase more than tripling the number of businesses to 700 in 2030. While this is a substantial increase, recent trends suggest that this development is feasible given a continued promotion of bicycling in Portland. Table 21 presents concrete results for the number of businesses and the number of employees for 2020, 2025, and 2030 for all three scenarios.

Table 21: Result of the projections in terms of number of bicycle-related businesses and number of employees for the years 2020, 2025, and 2030 divided by a low, medium, and high growth scenario.

Scenario	2020			2025		2030	
	AAGR	Businesses	Employees	Businesses	Employees	Businesses	Employees
Low	-0.02%	216	1469	216	1468	216	1466
Medium	8.15%	321	2176	475	3220	702	4765
High	12.97%	399	2707	734	4981	1351	9165

4.5 Significance of the Bicycle Industry

The results of the analysis are difficult to interpret without any measure on which to compare them. \$133.7 million in annual contribution to the local economy is a large figure but is it also a significant contribution? To better understand the size of the industry, the figures presented above can be compared to citywide figures. One measure is employment: The 1,469 employees in the bicycle industry makes up 0.34% of the total employment in the city. The employment of the manufacturing and retail segments each make up around 2% of the employment of their respective industry segments (see table 22). This is also true for the service sector, however, this only includes the recreational service sector, and therefore is not a representation of the service sector as a whole in Portland.

Table 22: The bicycle industry's share of the total employment in Portland in 2015 as well as within specific industry sectors. Please note that the sector chosen as representing the service segment of the bicycle industry far from include all of the service sector in Portland, but rather a specific niche related to recreational service. The data is from 2013 QCEW datasets and City of Portland Employment Forecast by Sector data.

Share of total employment in Portland, 2015	Bicycle industry	Portland	Share
Manufacturing	464.13	27,195	1.71%
Retail	796.79	34,515	2.31%
Wholesale/distribution	48.75	20,529	0.24%
Service	159.88	6,985	2.29%
Total	1,469.55	430,306	0.34%

Although the bicycle industry's share of the total employment in the city at first seem insignificant, it does, then, have an impact on the industry sectors in which it operates. Since the prime interest of this study is the industry's impact on the local economy figure 14 compares the results of the economic impact analysis with figures representing the total Portland economy, as used by the IMPLAN model. Here, the initial assessment (that the bicycle industry's share of the total economic activity in Portland is limited) seems to be confirmed. The comparison looks at employment, total compensation, and value added (including direct, indirect, and induced impacts). Similarly to the comparison of the direct employment (1469 jobs) in the bicycle industry, the share of the total employment is low at 0.41%. However, the shares of the total compensation to employees in the industry and the total value added to the local economy are even lower at 0.26% and 0.30%, respectively.

Thus, in all categories that are measured in this study, the Portland bicycle industry makes up less than 0.5% of the total Portland economy.

Comparison to the total economy gives one sense of perspective to the results. In addition, comparison to another industry segment in Portland might also provide insights to the relative size of the bicycle industry. A recent study from Portland State University, similar to this study, used IMPLAN to assess the economic impact of the food industry in the Portland Region. Comparing the food study's results for Multnomah County with the IMPLAN figures for the same area it is evident that the food economy comprise a large share of the local economy: The food industry's total employment makes up 13.11% of total employment in the county, the total compensation paid 7.27% of total compensation in the same area, and the total value added by the industry 8.58% of the county's economic activity (Green, Schrock, & Liu, 2015). Therefore, also in comparison with another industry sector as the food industry, the bicycle industry appears small in the Portland economy. The food industry, however, is a highly significant industry sector in Portland, and it includes general services as restaurants and drinking places (which accounts for 37% of the employment in the food industry). Therefore the comparison is unjust but does, notwithstanding, provide a measure for comparison and perspective.

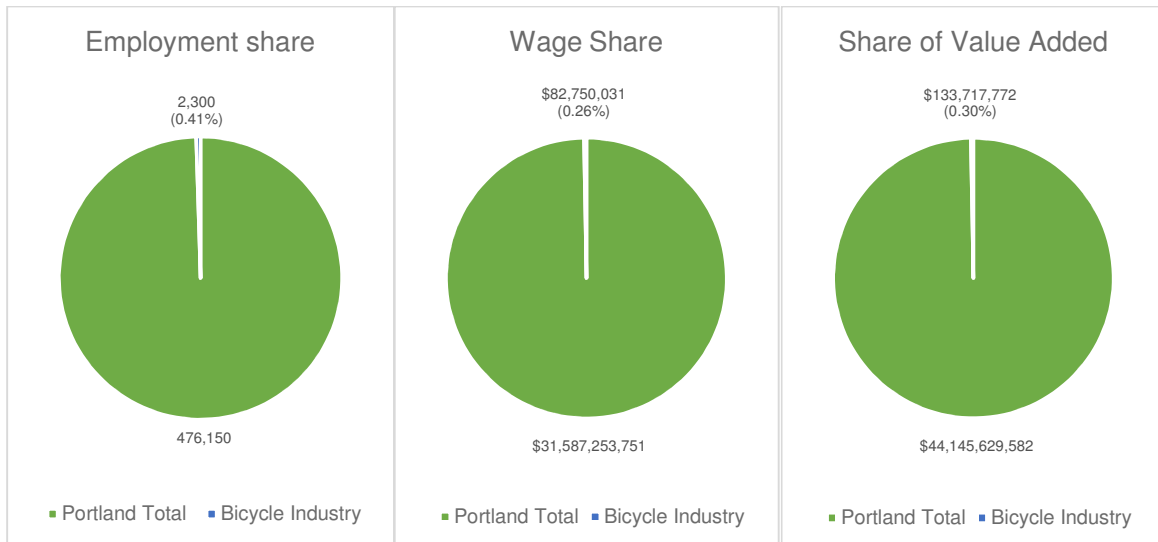


Figure 14: The Portland bicycle industry's share of the total local economy measured in terms of employment, wages, and value added. Data sources are 2013 QCEW and IMPLAN (v3.1).

5 The Perceived Needs and Trends of the Portland Bicycle Industry

The results of this chapter are based on responses from 32 bicycle-related businesses in Portland to the distributed questionnaire. Basic characteristics of the respondents include sub sector classification (manufacturing, retail, wholesale/distribution, service, or other) and the size of the business in terms of number of employees (sole proprietorship, less than 5, 5 to 10, or more than 10). The distribution of respondents by these basic variables are presented in figure 15. Note that no wholesale/distribution businesses responded to the questionnaire. However, a fairly equal distribution between sectors provides breadth to the responses, and moreover, the distribution matches the actual distribution found in the industry fairly well. In terms of business size, the respondents are divided equally between small businesses (less than 5 employees) and, in this context, medium sized to large businesses (with 5 employees or more). It is noteworthy that 16% of the respondents (five businesses) are sole proprietorships. These businesses are not represented in the dataset from the QCEW in the economic impact analysis but are apparently a potentially substantial share of the industry.

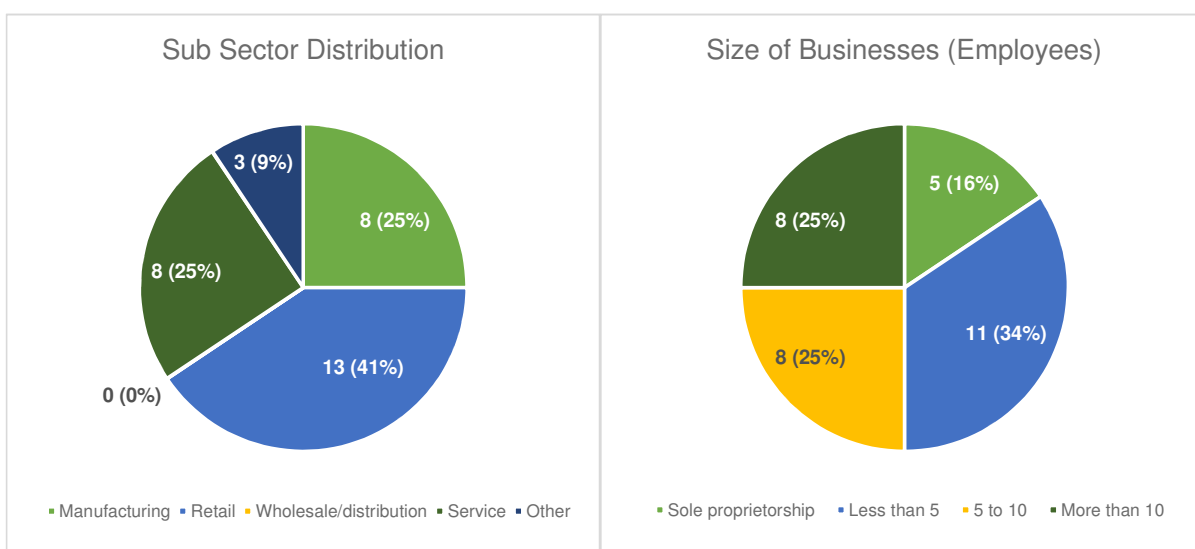


Figure 15: Sectorial distribution and size of businesses that responded to the questionnaire.

In the questionnaire, the respondents were asked about their view on the relation between basic factors in Portland in regards to bicycling, and their business. There is a general agreement with the four statements presented in figure 16: All respondents agree that Portland's bicycle friendly reputation is a benefit to their business and 80% agree that the reputation was a part of the reason for establishing in Portland. The high degree of agreement to the latter statement is somewhat surprising given that many of the businesses are small neighborhood shops that would be expected to weigh the pros and cons of different neighborhoods but not different cities. However, it could be a reflection of the influx of people that want to be part of the Portland bicycle culture and are therefore attracted to Portland to start a business.

The vast majority of the respondents (31 of 32) also agree that investments in bicycle infrastructure, directly or indirectly, benefit their business; a clear acknowledgement that deliberate efforts to increase ridership is a prerequisite for the growth in the industry. Whether Portland is a good city in which to conduct business is generally supported (approximately two-thirds agree). Only two respondents disagree with the statement but almost one-third are either 'neutral' or 'don't know'. The large share is surprising since respondents are all operating businesses in Portland. However, it could be a reflection of the character of the small businesses that might not have extensive knowledge about the business conditions in other cities and therefore lack a basis for comparison.

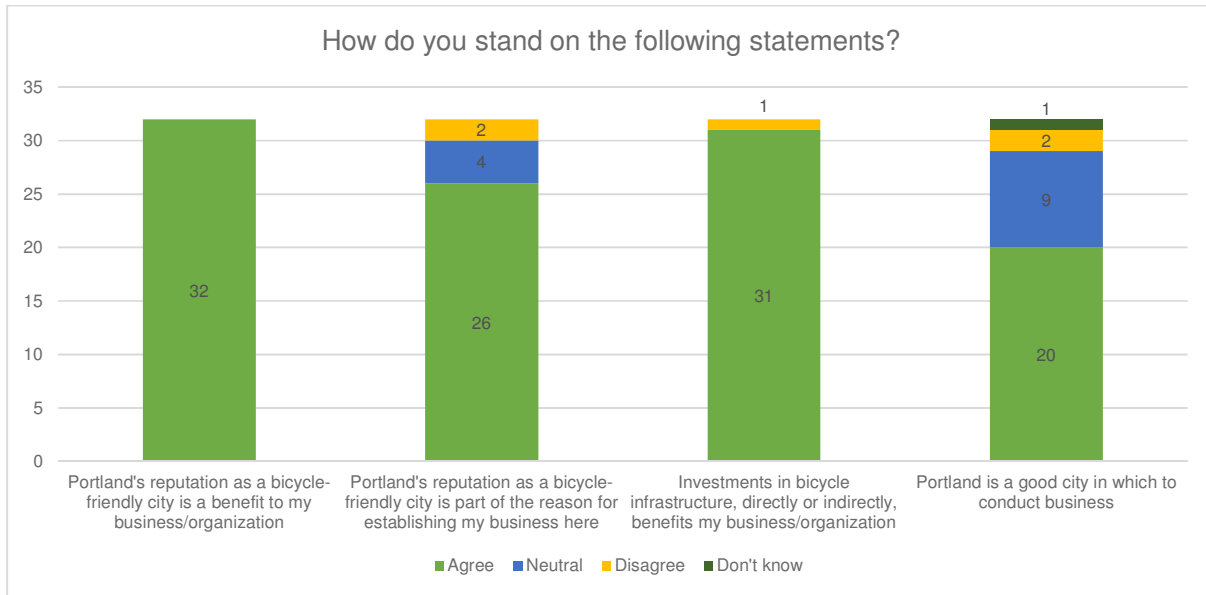


Figure 16: There is general agreement to the statements about the positive effects of Portland's reputation as a bicycle friendly city and the effects of investments in bicycle infrastructure. Whether Portland is a good city in which to conduct business is met by a large share of 'neutral' or 'don't know' answer. However, two-thirds still agree.

In figure 17, a list of 10 factors that are believed to influence the conditions for bicycle businesses are rated by importance. Eight of the 10 factors are rated by two-thirds or more of the respondents to be either 'essential', 'very important', or 'important'. Only 'access to freight infrastructure' is rated as 'not important' by more than one-third. 'Economic incentives' is rated as 'not important' by 25% of the respondents and in addition three respondents reply that they 'don't know'. The three factors that are rated as most 'essential' are 'quality of life' (all respondents regard it as either 'essential', 'very important', or 'important'), 'ability to attract qualified employees', and 'access to appropriate commercial space'. These are all rated as 'essential' by at least half of the respondents. For comparison, only four respondents rated 'tax and regulatory environment' as an 'essential' factor.

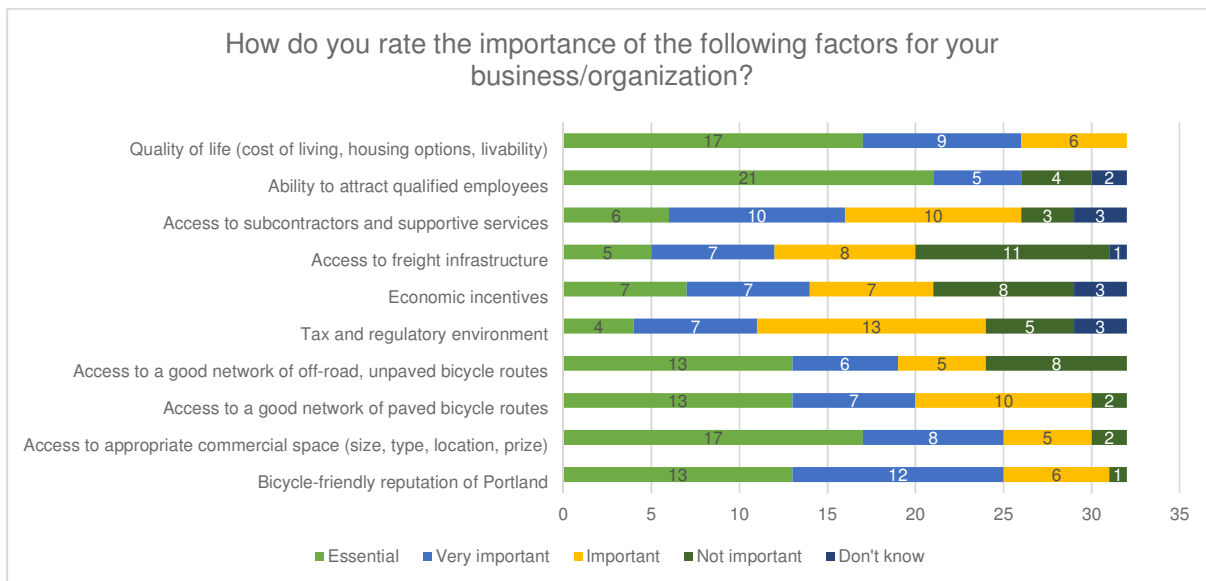


Figure 17: Rating of 10 factors that are believed to influence the conditions for bicycle businesses by importance.

Following the rating of the importance of the 10 factors, figure 18 presents an evaluation of the performance of Portland in nine of the factors (the factor 'Portland's reputation as a bicycle friendly city' is not included). The most striking feature of the distribution of answers is the high number of 'neutral' answers. For seven of the nine factors between one-third and two-thirds of the respondents state 'neutral'. This is very surprising, especially in the light of the rating of the importance of the factors shown in figure 19. Disregarding the 'neutral' answers, the answers show that there is a perception that there are good possibilities to attract qualified employees, there is access to a good network of paved bicycle routes, there is good access to sub-contractors, and that there is good access to freight infrastructure. Whether Portland provides the framework for a high quality of life is inconclusive, 14 agrees and eight disagrees. Around one-third of the respondents disagrees with the statements that there is access to appropriate commercial space (seven agrees), and that the tax and regulatory environment, and economic incentives, enable viable businesses opportunities. The majority of the respondents (70%) disagree with the statement that Portland offers a good network of off-road, unpaved bicycle routes.

Lastly, asked whether the respondents expect their business to grow over the next 5 years, 31 of 32 replied 'yes' showing a remarkable belief in the development of the bicycle industry.

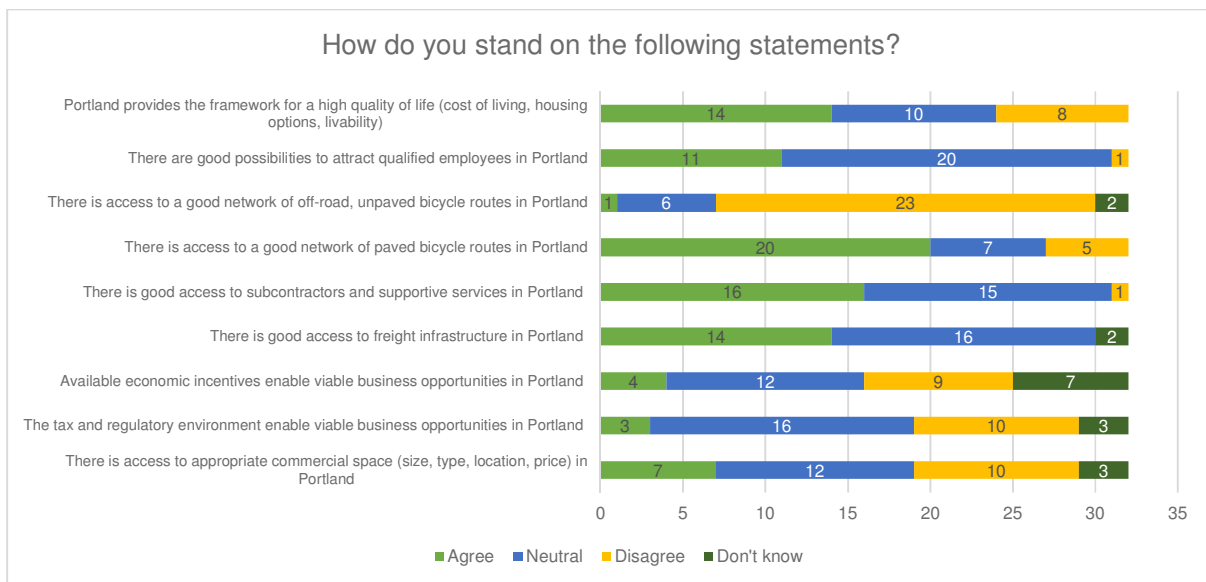


Figure 18: Evaluation of the performance of Portland in nine of the 10 factors presented in figure 19 (Portland's reputation as a bicycle friendly city is not included) as perceived by the bicycle industry respondents.

Table 23 compares the respondent's statements about the importance of nine of the 10 factors believed to influence the conditions for the bicycle industry with their evaluation of Portland's performance for each of the factors. To ease the comparison the 'neutral' and 'don't know' replies are sorted out and the percentages are therefore not representative of the whole dataset. The ranking of the importance of the factors shows that all nine are perceived as important. However, 'economic incentives' and 'access to freight infrastructure' less than the remaining seven. More than three quarters of the respondents that did not answer 'neutral' or 'don't know' agree that Portland has good access to freight infrastructure, subcontractors and supportive services, a good network of paved bicycle routes, and that there is good possibilities to attract qualified employees. More than three quarters disagree, however, that there is good access to a good network of unpaved bicycle routes and that the tax and regulatory environment enable viable business opportunities. In addition, between 50% and 75% disagrees that there is access to appropriate commercial space and that the available economic incentives enable viable business opportunities.

By comparing these results it can be evaluated whether the factors rated as the most important are also perceived to be functioning well in Portland. Thus, the nine factors are judged on a scale from high importance and functioning well in Portland (which equals the answer ‘agree’ in the evaluation), to medium importance and functioning well, to medium importance and not functioning well (equals ‘disagree’) and to high importance and not functioning well. The analysis shows that especially three factors, ‘possibility to attract qualified employees’, ‘access to subcontractors and supportive services’, and ‘access to a good network of paved bicycle routes’, perform well since they are all ranked as important and perceived as functioning well in Portland. One factor, ‘access to freight infrastructure’, are evaluated to function well but only score medium importance. Quality of life is perceived as important by all respondents, but whether Portland performs well in this regards is inconclusive. Almost 70% disagrees that available economic incentives enable viable business opportunities but the factor is only rated as medium in importance. The remaining three factors constitute a potential focus area since they are perceived to not be functioning well in Portland but are ranked to be of high importance to the bicycle industry. These are ‘access to appropriate commercial space’, ‘a good network of unpaved bicycle routes’, and ‘the tax and regulatory environment’.

Table 23: Comparison of the respondents’ statements about the importance of nine factors believed to influence the conditions for the bicycle industry with their evaluation of Portland’s performance for each of the factors. The darkest blue are factors rated as important and as performing well, the lightest blue are factors rated as equally important but perceived to be not functioning well. The two middle categories are factors not perceived as, as important as the remaining factors, and/or it is inconclusive whether they function well. To ease the comparison the ‘neutral’ and ‘don’t know’ replies are sorted out and the percentages are therefore not representative of the whole dataset.

Factors	Importance		Functioning well in Portland	
	Important	Not important	Agree	Disagree
Access to subcontractors and supportive services	89.66%	10.34%	94.12%	5.88%
Access to a good network of paved bicycle routes	93.75%	6.25%	80.00%	20.00%
Attract qualified employees	86.67%	13.33%	91.67%	8.33%
Access to freight infrastructure	64.52%	35.48%	100.00%	0.00%
High quality of life	100.00%	0.00%	63.64%	36.36%
Available economic incentives	72.41%	27.59%	30.77%	69.23%
Access to appropriate commercial space	93.75%	6.25%	41.18%	58.82%
The tax and regulatory environment	82.76%	17.24%	23.08%	76.92%
Access to a good network of unpaved bicycle routes	75.00%	25.00%	4.17%	95.83%

While a large part of the questionnaire consisted of close-ended questions for which results are presented above, open-ended questions were designed to let the respondents comment on general issues of the bicycle industry and what the City of Portland could potentially do to improve them. The topics of the comments can generally be divided in to two categories; (1) bicycle infrastructure and facilities⁹, and (2) policies and economic incentives. The former is the most consistent theme and appears in some form in most of the comments. The latter is not as prevalent and is mostly concerned with the issue of affordability and the issues of small businesses in general.

The respondents recognize the connection between the investment in bicycle infrastructure and facilities and the success of the bicycle industry. While many respondents acknowledge the work the city has done to improve conditions for bicyclists through the investments in paved bicycle routes many express concern over what is perceived as a stagnation of improvement in conditions for the city’s bicyclists. One manufacturer sums up the issue:

⁹ The distributed questionnaire was also designed to collect data to inform the work on the *Portland Off-Road Cycling Master Plan*. Therefore, a disproportionate amount of the comments regard issues on unpaved, off-road bicycle routes. These comments are not reflected to the same degree in this study. However, the main points are included in the bicycle infrastructure and facilities comments.

“Our ability to attract employees, develop additional product market categories, and maintain the Portland-premium of bicycle-related knowledge and expertise is directly tied to our reputation as a bicycling Mecca. Without off road bicycle access, our reputation and ranking is decreasing by the day. Making Portland THE bicycle friendly destination is critical to our success. The lack of off road access hurts this reputation and our ability to deepen our commitment to this market.”

This perception is shared by many of the respondents but does not limit itself to the provision of off-road facilities; just as many respondents highlight the importance of continued investments in on-street bicycle infrastructure. Another manufacturer comments:

“I’ve noticed that the development of on-street bicycling infrastructure has stagnated over the past five years. It’s because of the strong development of infrastructure that there is a vibrant bike industry here now. This industry will only stay if Portland continues to advance its biking access and infrastructure.”

For the respondents, the causality of infrastructure investments, maintaining the bicycle friendly reputation of Portland, and the growth of the bicycle industry is very clear and appears to be paramount. And this is true for all the sub sectors. Thus, asked how the City of Portland can support the local bicycle industry, one retail business simply comments: *“Continue to make investments in bicycle-friendly infrastructure”*. Similarly, a service business calls for *“[b]etter bike infrastructure”*.

In addition to the provision of infrastructure, the respondents are most concerned with affordability of commercial space, and the possibility for a variety of economic incentives for small businesses. These comprise the theme for the second category of comments. *“Cost of living is getting out of hand, commercial rent is outrageous”*. That is how a bicycle rental business formulates the concerns on commercial affordability. Similar concerns are put forward by a wide range of respondents. Respondents call for tax incentives, zoning flexibility, subsidies for health care and liability insurance, business development assistance, and commercial rent assistance in order to improve economic performance. One business from the service sector also stressed the *“bureaucratic burden [when] starting and growing a small business”* as a large issue. Many of these concerns do not seem to confine specifically to the bicycle industry but rather to the frameworks and conditions for small businesses in Portland in general. However, since many bicycle businesses, as well as most of the respondents of this survey, employ less than 10 people it seems to be a large perceived issue for most of the industry. As one manufacturer puts it: *“We’re small businesses, and PDC [Portland Development Commission which manages many of the programs for economic support] seems to be set up to help medium-large businesses”*. However, not all respondents share that opinion. A retail business, employing 5-10 people, comments: *“We would never have been successful without you [the City]. (especially PDC!)”*.

6 Barriers and Opportunities for the Bicycle Industry

The results of the economic impact analysis and the survey of bicycle-related businesses are generally well in line but also complement each other in terms of providing exclusive knowledge; while the economic impact analysis has focused on a snapshot of the economic contribution of the industry, the survey has provided insights to its needs and trends. By combining results of the two approaches new insights can be gained. In the discussion below, several subjects are treated including the crucial importance of bicycle infrastructure, the perceived barriers for growth in the bicycle industry, the non-quantifiable strengths of the Portland bicycle industry, and the future for the industry.

6.1 The Importance of Infrastructure Investments

One of the most consistent features of the results of the survey is the great focus on investment in bicycle infrastructure and facilities as a prerequisite for growth in the industry. The majority of the respondents perceive a clear causality between the provision of infrastructure and the growth of their business. This is apparent in the comments on how the City of Portland can improve conditions for the industry, and since 31 of 32 respondents state that investments in bicycle infrastructure, directly or indirectly, benefits their business. It is interesting that this is the main focus for most of the respondents – more so than tax levels, commercial affordability, and economic incentives. In addition, the majority identified access to a good network of paved bicycle routes as one of the most important factors for the development of the industry (30 identified it as either ‘Essential’, ‘Very important’, or ‘Important’ and two responded ‘Don’t know’). These results indicate the need for continued investment to support infrastructure for bicyclists across Portland, attract new riders, and maintain the bicycle friendly reputation of the city. In line with this perception, the respondents also identified the lack of a good network of off-road, unpaved bicycle routes as a main challenge. This perceived issue is currently being addressed in the work with the *Portland Off-Road Cycling Master Plan*.

Comparing development in the number of bicycle businesses in the period 2002 to 2013 from the QCEW data with the development in the length of the (paved) bicycle network an almost perfect (Pearson¹⁰) correlation is found ($r = 0.99$) providing tentative evidence for the perception of the industry. Since the analysis is based on a limited amount of data there is some uncertainties to this result, but the correlation is so strong that it is hard to dismiss and research on the area supports the result (Pucher, et al., 2010). Moreover, the correlation is not surprising and it seems logical that a growing network for bicycles would support the development of the bicycle industry through increased ridership. Portland’s bicycle coordinator has also highlighted this connection between infrastructure and ridership on several occasions (Geller, 2011).

Similar studies of the economic impact of bicycle-related businesses in other regions of the US have also included economic impact analyses of the provision of bicycle infrastructure (Brown & Hawkins, 2013; Resource Systems Group, Inc., 2012). This seems well justified especially in the light of the importance of the infrastructure, as shown above. While it has not been a part of the scope of this project, the City of Portland has recently received a grant from the National Institute for Transportation and Communities to perform an analysis of the economic impact of investments in active transportation infrastructure in Portland. The study will be carried out in late 2016 and the results will complement the results of this project well.

6.2 Perceived Barriers for Growth

Even though infrastructure improvements is the most consistent concern in the responses, issues about affordability and general conditions for small businesses are also aired by many respondents. Respondents report increases in commercial rents and general higher cost of living for employees and customers alike and call for public intervention through tax breaks and economic incentives and support. In that way, many of the concerns

¹⁰ The correlation between sets of data is a measure of how well two datasets are related. It thus shows the linear relationship between two sets of data. The most common measure of correlation is the ‘Pearson Correlation’.

of the respondents seem to be general to small businesses across sectors. The Portland Development Commission provides several programs for small businesses; from the *Financial Assistance and Loans* program that offers several loan funds to assist businesses with equipment purchases, property acquisition, working capital and credit enhancement, to community-driven, self-help approaches through the *Neighborhood Prosperity Initiative & Main Street Network* program (Portland Development Commission, 2015). While many of the programs are potentially available to bicycle-related businesses the respondents seem to call for more extensive programs. In general, however, the majority of the businesses (20 out of 34) agreed that Portland is a good city in which to conduct business. Only two respondents disagreed with that statement. However, asked specifically about the tax and regulatory environment and available economic incentives in Portland, a large share of the respondents reported unsatisfactory performance. As far as the tax and regulatory environment goes, this is not surprising since Portland is known for a high tax level and extensive regulation.

The issues around affordability for residents and businesses alike are topical in Portland as in other larger cities on the West Coast (Beebe, 2015). Increasing rents can be devastating for neighborhood businesses that depend on a location close to its customers in the local community – or that their customers can afford to keep living close to the business. Small businesses are in general more flexible and more willing to adapt to changing landscapes than large organizations. They are not as demanding in terms of commercial space in the sense that they do not need large inflexible spaces. Conversely, the small businesses are more sensitive to rising costs in the form of rent levels. Small manufacturers might be less susceptible to such changes since they are often less dependent on specific geographic locations. Small retail businesses, however, are often dependent on a specific location close to its regular customers, etc., and a rent-driven relocation can be devastating in such a case. Although the importance of factors such as access to appropriate commercial space can be analyzed based on variables as business size and industry classification in this study, the number of respondents severely limits the generalizability of the results. Therefore, no such attempt is made. Like with the tax and regulatory environment and available economic incentives, commercial affordability is an issue for small businesses in general. Since both the data analysis and the questionnaire carried out in this study show that the bicycle industry consists mainly of small businesses (less than 10 employees) the issues of small businesses in general are very relevant for the bicycle industry in Portland.

In total, three factors identified in the questionnaire represent what the bicycle industry perceives as the greatest challenge to further growth and development for bicycle-related businesses: ‘access to appropriate commercial space’, ‘a good network of unpaved bicycle routes’, and ‘the tax and regulatory environment’. These factors could be used as a guide for future action. As already mentioned, work is already underway on the network of unpaved bicycle routes and the two remaining factors are issues for small businesses in Portland in general.

6.3 The Inherent Strengths of the Industry

In addition to being made up of many small businesses, the Portland bicycle industry is diverse in the sense that the bicycle-related businesses span over several industry sectors and they oftentimes share the same qualified workforce and are interdependent in business to business transactions. From a regional economic perspective, such a network of small and interconnected businesses is an important asset (Robbins, Pantuosco, Parker, & Fuller, 2000). Therefore, the bicycle industry represents an economic sector that does not need to import very much but instead increasingly are replacing imports with local production. This is both true for the consumer who can buy locally produced bicycles, bicycle gear, apparel, accessories, etc. (replacing imports of bicycles but also of cars and fuel (Cortright, 2007)) and for the local businesses that can supply each other with different bicycle parts, materials, and services. The industry is not only replacing imports but at the same time creating possible future exports to other cities that lack a local bicycle industry. This process of import substitution and export creation is essential for the local economy (Jacobs, 1969; 1984). In addition, the fact that the extensive network of small businesses can rely on each other’s products and services provides a sound basis on which the industry can grow through new start-ups that need a vast network of suppliers to function.

This conception of the bicycle industry is partially confirmed by the results of the questionnaire where access to subcontractors and supportive services are rated as important and Portland being well-performing in this regard, along with ‘possibility to attract qualified employees’ and ‘access to a good network of paved bicycle routes’ (the bicycle friendly reputation of Portland could be added as well).

6.4 The Future for the Portland Bicycle Industry

Section 4.4 in this report provides a projection of the future development of the bicycle industry in Portland. The three presented scenarios results in substantially different sizes of the bicycle industry in the end year 2030. While the low growth scenario seems pessimistic, the high growth scenario might be optimistic. This study finds the medium growth scenario plausible, given a continued devotion to promoting bicycling in Portland, promising a substantial increase in the number of bicycle-related businesses towards 2030.

The results of this project show that there are several things that the City of Portland can do to further support the bicycle industry in its development. Firstly, the bicycle-related businesses see a clear causality between the provision of bicycle infrastructure and the success of the industry. This perception is initially confirmed by data analysis. It seems a clear objective for the City to keep promoting the extension of the bicycle networks, paved as off-road routes, as it is recommended in the *Portland Bicycle Plan for 2030*, as well as promoting bikeability in general and thereby also maintaining and developing Portland’s bicycle friendly reputation. Secondly, as the bicycle industry consists mainly of small businesses many of the issues that the businesses report to face are linked to general issues of affordability and larger economic and regulatory frameworks in the city. Addressing some of these issues could ease the condition for many of the bicycle-related businesses but are naturally linked to larger policy questions across the city and not exclusively to the bicycle industry. In general, the bicycle industry seems to thrive under the success of Portland as a bicycle city and efforts should therefore be specifically directed at maintaining and improving these conditions for the benefit of bicyclists and bicycle-related businesses alike.

7 Conclusion

Bicycling in Portland, Oregon has gone through a remarkable development since the last study on the economic impact of the bicycle industry in the city was carried out in 2006. Ridership has more than doubled to 23,000 commuters each day – that is 7% of all commute trips – and the bicycle network has been extended to well above 300 miles in length. In the light of these changes, this project has updated the original study on the economic impact of the Portland bicycle industry and extended it to encompass total economic impacts (direct, indirect, and induced) as well as an analysis of the needs and trends of the industry as perceived by bicycle-related businesses in Portland. The total economic impact is estimated through an economic impact analysis using 2013 data from the Quarterly Census of Employment and Wages as well as 2015 data about the size and composition of the bicycle industry collected by the authors of this study. The perceived trends and needs of the industry is represented by 32 responses to an online distributed questionnaire that was accessible for two weeks in late September 2015.

This study finds that in September 2015 the Portland bicycle industry was comprised by 217 businesses divided by retailers (100), manufacturers (78), wholesale/distribution (8) and service businesses (31). Based on employment data from the 2013 industry, it is estimated that these businesses employ almost 1,500 people who are paid \$39.4 million in compensations. The largest employment sectors are retail (800 jobs) and manufacturing (460 jobs) while the service and wholesale/distribution sectors are small in comparison (amounting to 200 jobs in combination). In total, the industry sales amount to an annual \$296 million (as well as a potential \$36.5 million from non-primary bicycle retailers, such as big box and sporting goods stores, not included in this study) with manufacturers and wholesale/distribution businesses accounting for two-thirds of the sales. Accounting for both direct, indirect, and induced impacts, the economic activity of the Portland bicycle industry supports a total of 2,300 jobs with a total compensation of \$82.7 million. The total value added to the local economy (gross regional product) is \$133.7 million annually and the total output of the industry is \$315.5 million. The sector with the largest employment in the industry is retailers, a sector that includes bike shops and rentals as well as retailers of accessories, apparel and outerwear. In total, the economic impacts of the bicycle industry generates \$27 million in taxes of which \$10 million is in state and local taxes.

Historical QCEW data shows that since 2002 the bicycle industry has experienced high growth rates and have gone from a total of 22 businesses (2002) to 217 (2015). Thus, average annual growth rates between 2002 and 2013 was 12.97% for the number of businesses and 11.45% for the number of employees. These significant growth rates show that the industry is in rapid development. It cannot, however, be assumed that this level of development will continue. Instead, a projection of the size of the bicycle industry in 2030 is based on the assumption that the bicycle industry will follow the development trends projected based on the prior studies of the industry size, i.e. the growth the industry has shown from 2006-2015. Based on this assumption, the projection show a substantial increase in size towards 2030 seeing more than a tripling in the number of businesses.

The findings of the online self-administered questionnaire distributed to local bicycle businesses include a picture of Portland as a city which has a strong bicycle friendly reputation and a good network of bicycle routes, both of which create favorable conditions for bicycle-related businesses. Thus, there is a general consensus that investments in bicycle infrastructure and facilities, and the bicycle friendly reputation of Portland are prime drivers for growth in the bicycle industry. Many respondents were concerned, however, about a perceived stagnation in the provision of new facilities and especially the off-road network was deemed inadequate. Evaluating different factors believed to impact the conditions for the bicycle-related businesses, three factors were rated as ‘essential’ by more than a third of the respondents; ‘quality of life’ in Portland, ‘ability to attract qualified employees’, and ‘access to appropriate commercial space’. Surprisingly, many of the respondents did not rate the performance of Portland for the chosen factors but instead responded either ‘Neutral’ or ‘Don’t know’. Based on the responses that did evaluate the performance of Portland, a disjuncture between

the importance rating of the factors and the perceived performance of Portland is used as a sign of potential problem areas. These include the factors ‘access to appropriate commercial space’, ‘a good network of unpaved bicycle routes’, and ‘the tax and regulatory environment’. As this shows, many of the concerns aired in the survey were directly attributable to general conditions for small businesses in Portland; rent levels, costs of living (both for employees and customers), regulatory environment, tax levels, and lack of appropriate economic support and incentives.

Addressing the needs of the bicycle industry thus seems to be focused in two directions: Firstly, the bicycle-related businesses see a clear causality between the provision of bicycle infrastructure and the success of the industry. This perception is initially confirmed by data analysis showing a strong correlations between infrastructure provision and industry growth. It seems a clear objective for the City to keep promoting the extension of the bicycle networks, paved as off-road routes, as it is recommended in the *Portland Bicycle Plan for 2030*, as well as promoting bikeability in general and thereby also maintaining and developing Portland’s bicycle friendly reputation. Secondly, as the bicycle industry consists mainly of small businesses many of the issues that the businesses report to face are linked to general issues of affordability and larger economic and regulatory frameworks in the city. Addressing some of these issues could ease the condition for many of the bicycle-related businesses but are naturally linked to larger policy questions across the city and not exclusively to the bicycle industry. In general, the bicycle industry seems to thrive under the success of Portland as a bicycle city and efforts should therefore be specifically directed at maintaining and improving these conditions for the benefit of bicyclists and bicycle-related businesses alike.

A final important point of this project is the economic significance of the bicycle industry in Portland. Comparing the results of the economic impact analysis with figures for the total economic activity in Portland, it is evident that the bicycle industry is not in itself a capital industry sector in the Portland economy: By all measures the bicycle industry comprises less than 0.5% of the local economy. However, the industry does possess several important qualities that are essential to the local economy. Firstly, it is likely that the industry will grow substantially towards 2030. This is evident by historical trends, the clear link to infrastructure investment (that is a clear priority in the current bicycle plan), general perceptions in the industry itself, and the projections made in this study. Secondly, the inherent properties of the industry, i.e. characteristics such as composition and breadth, point to a resilient industry capable of supporting further growth. As the review of the bicycle industry in 2015 reveals, the businesses are diverse in the sense that they span over several industry sectors but also since there seems to be businesses in every step from the production and assembling to the sale and maintenance of a bicycle (or accessories and outerwear for that matter) as well as services for bicyclists. From a regional economic perspective, such a network of small and interconnected businesses is an invaluable asset. The industry is not only replacing imports by producing them locally but is also creating possible future exports to cities with no local bicycle industry. The fact that the extensive network of small businesses can rely on each other’s products and services provides a sound basis on which the industry can grow through new start-ups and relocations of businesses from other regions attracted by Portland’s bicycle friendly reputation.

8 Limitations and Need for Further Research

Several important choices have been made that influence the results of the analysis of this project in ways worth highlighting. These choices have been necessary in the light of the quality of the available data and the nature of the estimations of the economic characteristics of the bicycle industry. In section 3.1.5, the central uncertainties related to the results of the economic impact analysis are discussed in order to highlight certain limitations to this study's methodology. Some of these points are repeated here but also supplemented.

Due to the specific choices made and the uncertainties with the Quarterly Census for Employment and Wages (QCEW) data, the results of the economic impact analysis should be regarded as conservative estimates. This is, first of all, because the size of the industry in number of businesses (a basic variable in the methodology) is continuously underestimated due to several inaccuracies: (1) QCEW data does not contain information about sole proprietorships yet they are believed to be a large part of the bicycle industry in Portland (they made up 16% of the respondents to the questionnaire); (2) the properties of the QCEW (mainly the fact that it involves self-filing) are believed to cause an underrepresentation of small businesses in the dataset; (3) though the review of local bicycle-related businesses was thorough it is expected that not all relevant businesses were included. Secondly, the choice of key economic factors have a crucial influence on the final result of the analysis (the most optimistic results estimated more than 2,000 employees and \$70 million in compensations compared to 1,500 and \$40 million in the scenario used) but whether the chosen factors are representative of the industry, and therefore give an accurate picture of the industry's economic impact, is debatable.

In regards to the questionnaire, the low absolute number of respondents impose limitations on the generalizability of some of the findings. This is especially true for the results divided by the basic variables, sub sector classification (manufacturing, retail, wholesale/distribution, service, or other) and size of the business in terms of the number of employees (sole proprietorship, less than 5, 5 to 10, or more than 10). Consequently, the results cannot say anything significant about the differences in answers between industry sectors or business sizes. In general, the results of the questionnaire should be regarded as a qualitative input rather than quantifiable data.

Complementing the results of this project, two strands of further research are recommended: Firstly, the role of bicycle infrastructure in industry growth and as a contribution to the economic impact of bicycling. Research from other states shows that the economic impacts of such investments are substantial and in the light of the importance appointed to bicycle infrastructure by the Portland bicycle industry and the correlation identified between industry development and infrastructure investments, it is an area where further studies could highlight several important synergies and additional economic benefits of prioritizing bicycle development. Secondly, this study has not taken the economic impacts of bicycle tourism, events, races, and tours into account. This kind of contribution to the local economy is potentially substantial looking at results from other regions and in the light of the number and size of bicycle events in Portland. Therefore, further research is recommended.

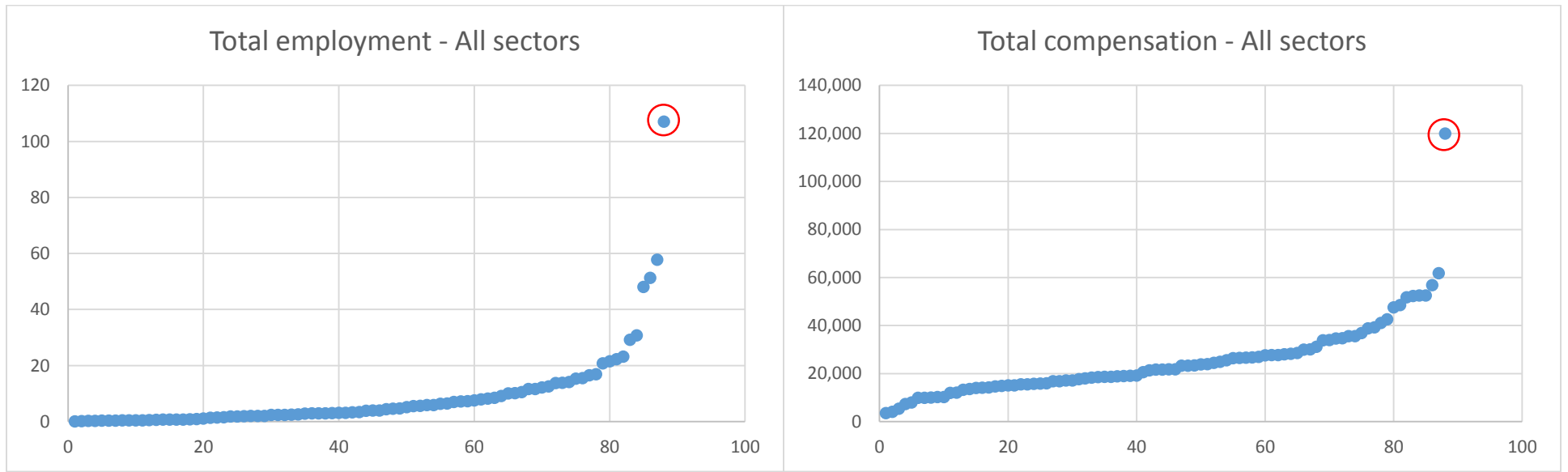
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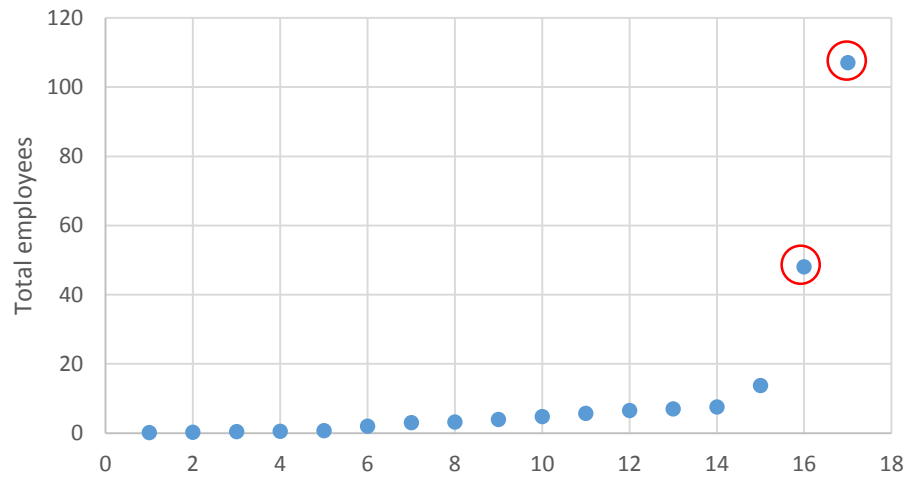
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Appendix A: Outliers in the 2013 QCEW employment and wage data

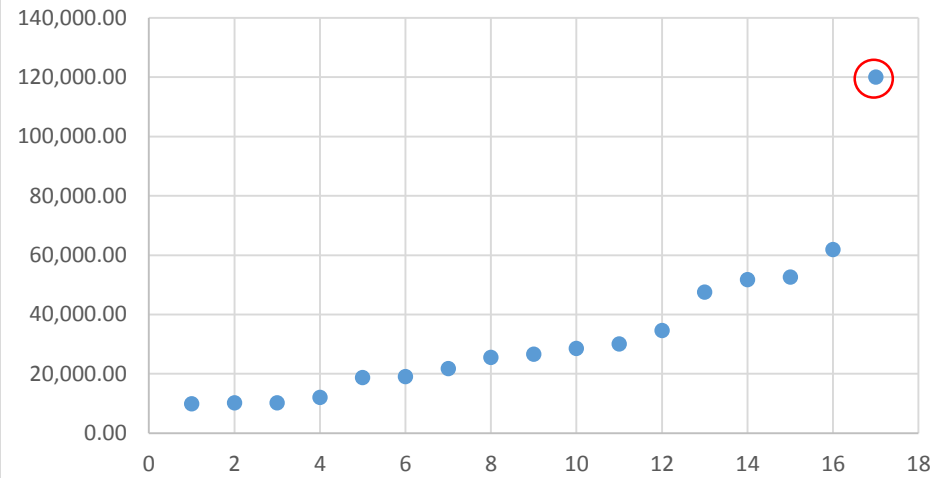
The following charts show the identified outliers (marked with a red circle) for each dataset.



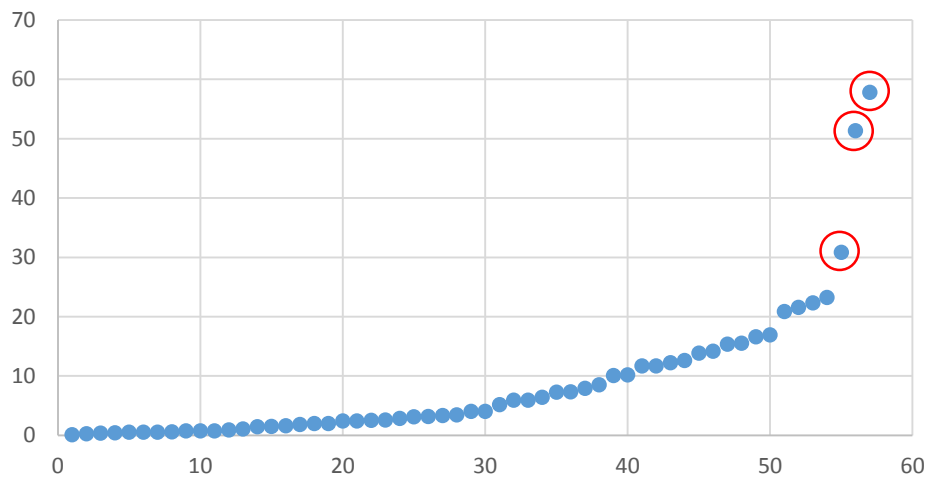
Total employment - Manufacture



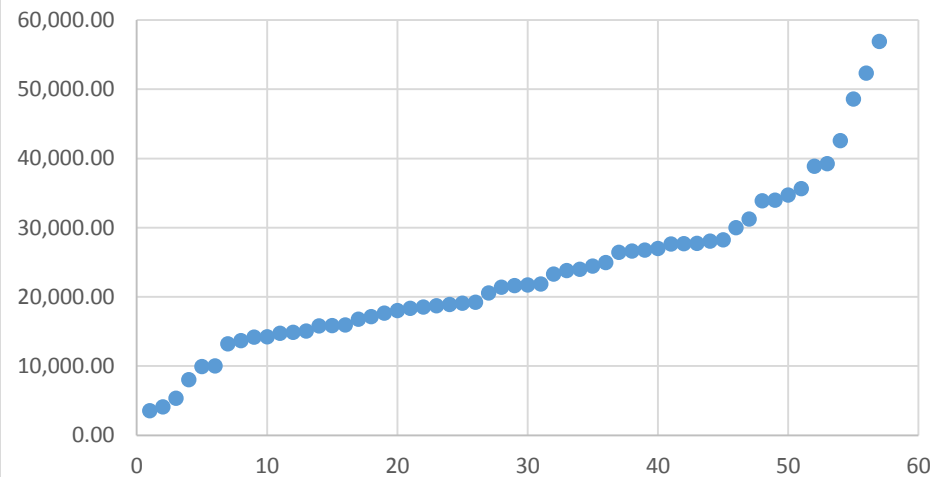
Total compensation - Manufacture



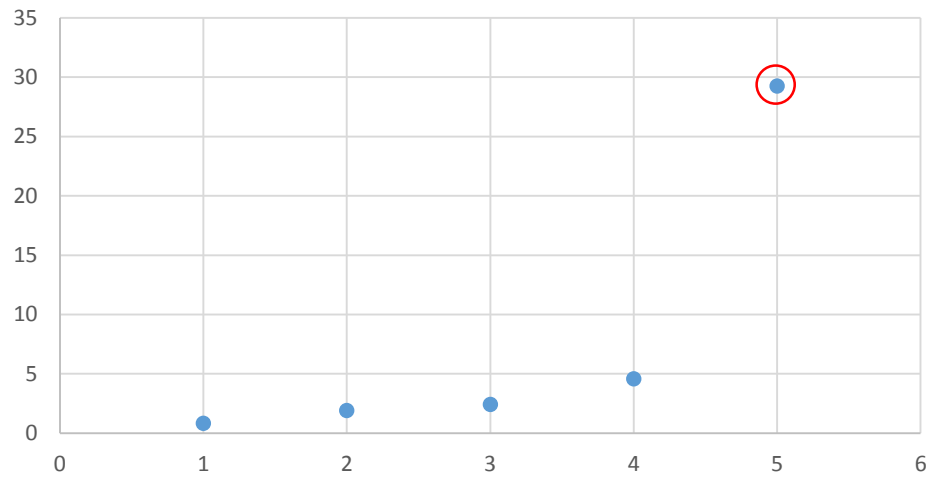
Total employment - Retail



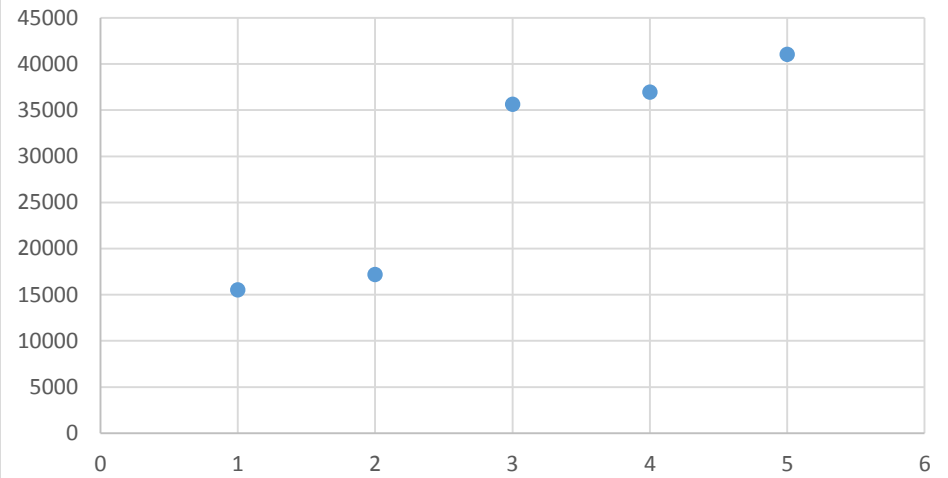
Total compensation - Retail



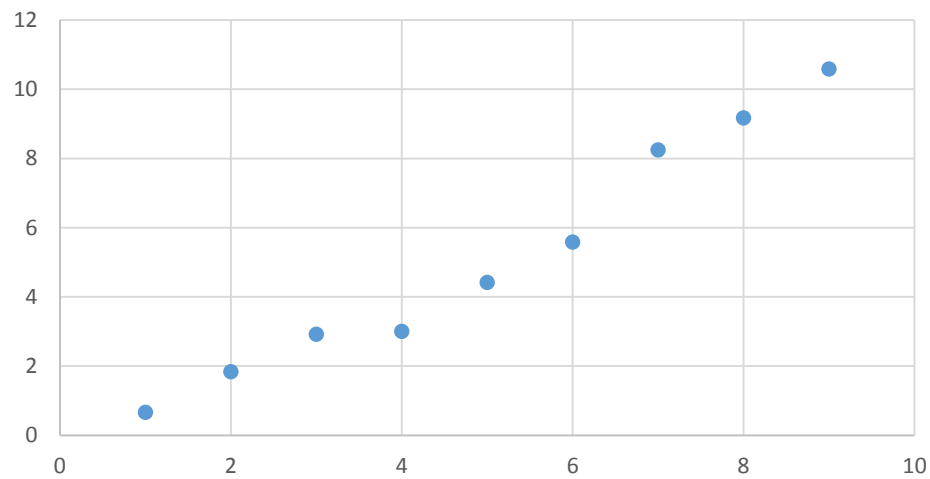
Total employment - Wholesale/distribution



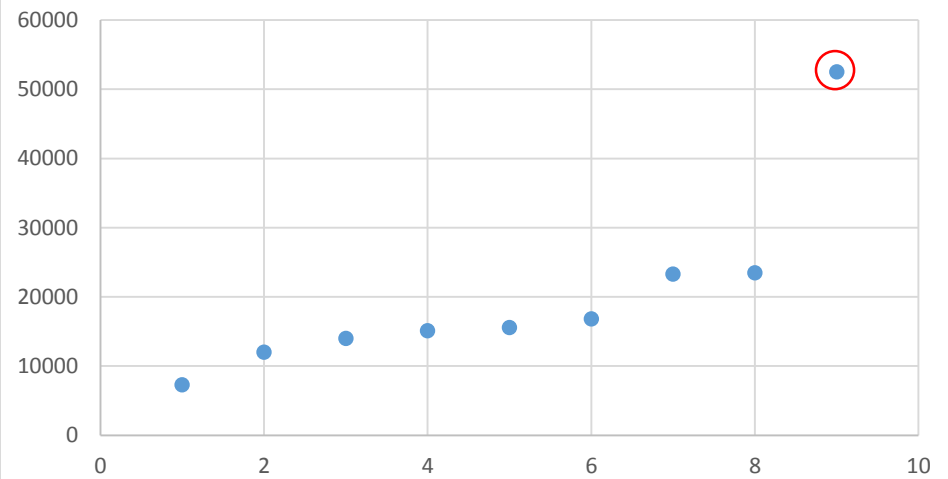
Total compensation - Wholesale/distribution



Total employment - Service



Total compensation - Service



Appendix B – IMPLAN industry codes and NAICS classifications

Relation between the 404 IMPLAN industry codes and the 2012 NAICS classifications.

<i>Industry sector</i>	<i>Industry code</i>	<i>Description</i>	<i>NAICS classification</i>
<i>Manufacture</i>	88	Men's and boys' cut and sew apparel manufacturing	315220
	94	Other leather and allied product manufacturing	316998, 314910
	197	Coating, engraving, heat treating and allied activities	332812
	292	Motorcycle, bicycle, and parts manufacturing	336991
	311	Sporting and athletic goods manufacturing	339920
<i>Retail</i>	320	Retail Stores - Motor vehicle and parts	441310
	327	Retail Stores - Clothing and clothing accessories	448150
	328	Retail Stores - Sporting goods, hobby, book and music	451110
	330	Retail Stores - Miscellaneous	453310, 453998
	363	General and consumer goods rental except video tapes and discs	532292
	418	Personal and household goods repair and maintenance	811490
<i>Service</i>	338	Scenic and sightseeing transportation and support activities for transportation	487110
	339	Couriers and messengers	492110
	383	Travel arrangement and reservation services	561520
	407	Fitness and recreational sports centers	713940, 713990
	413	Food services and drinking places	722513
<i>Wholesale/distribution</i>	319	Wholesale trade businesses	425120, 423910

Appendix C: Online questionnaire

The economic impact of the bicycle industry in Portland and The Portland Off-Road Cycling Masterplan

Information collected in this survey will be used to help inform two projects currently being conducted by the Bureau of Planning and Sustainability; the Economic Impact of the Bicycle Industry in Portland and the Portland Off-road Cycling Master Plan. Data from this survey will be used as part of an effort to understand the needs and perceptions of the bicycle industry in Portland as well as to help inform the work of the Off-road Cycling Master Plan. All information collected in this survey is confidential and will not be shared outside of the scope of these two projects.

You need to answer all questions on a given page. When you have done so, proceed by clicking Next. When you reach the last page of the survey it is important that you press Finish and in that way complete the survey. Please fill out the survey by September 30th.

To begin the survey, press Next. Thank you for participating!



This survey targets bicycle-related businesses and organizations in Portland, Oregon. We need to make sure that you are the target for this survey.

Is your business/organization located in the City of Portland, Oregon?

- (1) ☐ Yes
- (2) ☐ No

Does your company sell, produce, distribute, or import bicycles, bicycle related products or accessories, or cater to bicyclists?

- (1) ☐ Yes
- (2) ☐ No

Please provide us some basic information about your company/organization:

What is the address of your company/organization?

[text field]

In what zip code area is your company/organization located?

- | | | |
|-------------------------------------|-------------------------------------|-------------------------------------|
| (1) <input type="checkbox"/> 97201 | (41) <input type="checkbox"/> 97213 | (51) <input type="checkbox"/> 97229 |
| (32) <input type="checkbox"/> 97202 | (42) <input type="checkbox"/> 97214 | (52) <input type="checkbox"/> 97230 |
| (33) <input type="checkbox"/> 97203 | (43) <input type="checkbox"/> 97215 | (53) <input type="checkbox"/> 97231 |
| (34) <input type="checkbox"/> 97204 | (44) <input type="checkbox"/> 97216 | (54) <input type="checkbox"/> 97232 |
| (35) <input type="checkbox"/> 97205 | (45) <input type="checkbox"/> 97217 | (55) <input type="checkbox"/> 97233 |
| (36) <input type="checkbox"/> 97206 | (46) <input type="checkbox"/> 97218 | (56) <input type="checkbox"/> 97236 |
| (37) <input type="checkbox"/> 97209 | (47) <input type="checkbox"/> 97219 | (57) <input type="checkbox"/> 97239 |
| (38) <input type="checkbox"/> 97210 | (48) <input type="checkbox"/> 97220 | (22) <input type="checkbox"/> 97266 |
| (39) <input type="checkbox"/> 97211 | (49) <input type="checkbox"/> 97222 | (23) <input type="checkbox"/> 97296 |
| (40) <input type="checkbox"/> 97212 | (50) <input type="checkbox"/> 97227 | (25) <input type="checkbox"/> Other |

What is the primary classification of your company or organization?

- (1) ☐ Manufacturing
- (2) ☐ Retail
- (3) ☐ Wholesale/distribution
- (5) ☐ Service
- (4) ☐ Other (please specify below) _____

How many employees did you on average employ in 2015, at any given time, including owners?

- (1) ☐ Sole proprietorship
- (4) ☐ Less than 5
- (3) ☐ 5 to 10
- (2) ☐ More than 10

How do you stand on the following statements?

	Agree	Neutral	Disagree	Don't know
Portland's reputation as a				
bicycle-friendly city is a benefit to	(1) <input type="checkbox"/>	(5) <input type="checkbox"/>	(6) <input type="checkbox"/>	(7) <input type="checkbox"/>
my business/organization				

	Agree	Neutral	Disagree	Don't know
Portland's reputation as a bicycle-friendly city is part of the reason for establishing my business here	(1) <input type="checkbox"/>	(5) <input type="checkbox"/>	(6) <input type="checkbox"/>	(7) <input type="checkbox"/>
Investments in bicycle infrastructure, directly or indirectly, benefits my business/organization	(1) <input type="checkbox"/>	(5) <input type="checkbox"/>	(6) <input type="checkbox"/>	(7) <input type="checkbox"/>
Portland is a good city in which to conduct business	(1) <input type="checkbox"/>	(5) <input type="checkbox"/>	(6) <input type="checkbox"/>	(7) <input type="checkbox"/>

How do you rate the importance of the following factors for your business/organization?

	Essential	Very important	Important	Not Important	Don't know
Bicycle-friendly reputation of Portland	(1) <input type="checkbox"/>	(5) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>
Access to appropriate commercial space (size, type, location, prize)	(1) <input type="checkbox"/>	(5) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>
Access to a good network of paved bicycle routes	(1) <input type="checkbox"/>	(5) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>
Access to a good network of off-road, unpaved bicycle routes	(1) <input type="checkbox"/>	(5) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>
Tax and regulatory environment	(1) <input type="checkbox"/>	(5) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>
Economic incentives	(1) <input type="checkbox"/>	(5) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>
Access to freight infrastructure	(1) <input type="checkbox"/>	(5) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>
Access to subcontractors and supportive services	(1) <input type="checkbox"/>	(5) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>

The Economic Impact of the Bicycle Industry in Portland, appendix C

	Essential	Very important	Important	Not Important	Don't know
Ability to attract qualified employees	(1) <input type="checkbox"/>	(5) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>
Quality of life (cost of living, housing options, livability)	(1) <input type="checkbox"/>	(5) <input type="checkbox"/>	(2) <input type="checkbox"/>	(3) <input type="checkbox"/>	(4) <input type="checkbox"/>

How do you stand on the following statements?

	Agree	Neutral	Disagree	Don't know
There is access to appropriate commercial space (size, type, location, price) in Portland	(1) <input type="checkbox"/>	(5) <input type="checkbox"/>	(6) <input type="checkbox"/>	(7) <input type="checkbox"/>
The tax and regulatory environment enable viable business opportunities in Portland	(1) <input type="checkbox"/>	(5) <input type="checkbox"/>	(6) <input type="checkbox"/>	(7) <input type="checkbox"/>
Available economic incentives enable viable business opportunities in Portland	(1) <input type="checkbox"/>	(5) <input type="checkbox"/>	(6) <input type="checkbox"/>	(7) <input type="checkbox"/>
There is good access to freight infrastructure in Portland	(1) <input type="checkbox"/>	(5) <input type="checkbox"/>	(6) <input type="checkbox"/>	(7) <input type="checkbox"/>
There is good access to subcontractors and supportive services in Portland	(1) <input type="checkbox"/>	(5) <input type="checkbox"/>	(6) <input type="checkbox"/>	(7) <input type="checkbox"/>
There is access to a good network of paved bicycle routes in Portland	(1) <input type="checkbox"/>	(5) <input type="checkbox"/>	(6) <input type="checkbox"/>	(7) <input type="checkbox"/>
There is access to a good network of off-road, unpaved bicycle routes in Portland	(1) <input type="checkbox"/>	(5) <input type="checkbox"/>	(6) <input type="checkbox"/>	(7) <input type="checkbox"/>

	Agree	Neutral	Disagree	Don't know
There are good possibilities to attract qualified employees in Portland	(1) <input type="checkbox"/>	(5) <input type="checkbox"/>	(6) <input type="checkbox"/>	(7) <input type="checkbox"/>
Portland provides the framework for a high quality of life (cost of living, housing options, livability)	(1) <input type="checkbox"/>	(5) <input type="checkbox"/>	(6) <input type="checkbox"/>	(7) <input type="checkbox"/>

Do you anticipate that your business will grow over the next 5 years?

- (1) ☐ Yes
(2) ☐ No

Does your company/organization manufacture, sell, or service mountain bikes and/or accessories, or serve mountain bike riders?

- (1) ☐ Yes
(2) ☐ No

Please slide the bar to the appropriate share (in percent).

How much of your business would you estimate can be attributed off-road bicycling (in percent)?

- | | | |
|---------------------------------|----------------------------------|-----------------------------------|
| (1) <input type="checkbox"/> 0 | (8) <input type="checkbox"/> 35 | (15) <input type="checkbox"/> 70 |
| (2) <input type="checkbox"/> 5 | (9) <input type="checkbox"/> 40 | (16) <input type="checkbox"/> 75 |
| (3) <input type="checkbox"/> 10 | (10) <input type="checkbox"/> 45 | (17) <input type="checkbox"/> 80 |
| (4) <input type="checkbox"/> 15 | (11) <input type="checkbox"/> 50 | (18) <input type="checkbox"/> 85 |
| (5) <input type="checkbox"/> 20 | (12) <input type="checkbox"/> 55 | (19) <input type="checkbox"/> 90 |
| (6) <input type="checkbox"/> 25 | (13) <input type="checkbox"/> 60 | (20) <input type="checkbox"/> 95 |
| (7) <input type="checkbox"/> 30 | (14) <input type="checkbox"/> 65 | (21) <input type="checkbox"/> 100 |

Would you estimate that the share has been rising in the last five years?

- (1) ☐ Yes
(2) ☐ No
(4) ☐ Don't know

What can the City of Portland do to further support the bicycle industry in Portland?

If you have any final comments please use the field below

We would like to know more about your views on Portland and bicycling. If we may contact you for a brief interview please fill out the below fields.

How would you like to be contacted (please provide contact information for the options you choose)?

- (1) ☐ Email _____
- (2) ☐ Phone _____
- (3) ☐ I do not wish to be contacted.

If you wish to participate in the draw for a \$20 gift certificate for New Seasons, please provide your email address below. One respondent will be randomly selected (the email addresses will be considered confidential and will only be used by BPS staff to contact the winner).

Thank you for participating, your inputs are very valuable to us. Please press Finish to complete the survey.

Appendix D: Spatial Distribution of the Portland Bicycling Industry

