ECF

EUROPEAN CYCLISTS' FEDERATION

CYCLING WORKS

Jobs and Job Creation in the Cycling Economy

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CYCLING WORKS

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ABOUT THE EUROPEAN CYCLISTS' FEDERATION

ECF is the umbrella federation of bicycle users' organizations in Europe and beyond. Our aim is to have more people cycling more often and we target to double cycling by 2020 in Europe. To reach this goal we work with our members and partners on putting cycling on the agenda at global, European, national and regional level.

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FOREWORD

Dear Reader,

As Chairman of the Cycling Industry Club's Advisory Board, it is my pleasure to offer the full backing of the cycling industry sector for this important publication.

This study is part of a long-term collaboration between ECF and the cycling industry in the framework of the Valuing Cycling Project. The aim of this project is to collect robust data on the cycling sector and its potential for the European economy in order to make the investment case for cycling at European, national and local level. By providing sound data to decision-makers, it will help to put cycling on equal terms with other transport modes and other sectors of the economy. Given the current economic situation, job creation is one of the most pressing issues for Europe. This study shows the great potential that cycling has in this respect – more than 1 million cycling related jobs could exist in the EU if ECF's goal to double the modal share of cycling was reached. That is not just good for employment; it releases the multiple benefits of cycling including reduction of CO_2 emissions, better air quality, reduced congestion and improved public health.

To achieve this public investment is needed. Together with ECF, the companies of the Cycling Industry Club hope that this study will help to boost investment in cycling and thus further the prosperity of Europe, its economy and its citizens. We look forward to working with policy makers at all levels to achieve these results.

Tony Grimaldi
President and CEO of Cycleurope
Chairman of the Cycling Industry Club Advisory Board

INTRODUCTION BY THE EUROPEAN CYCLISTS' FEDERATION

In reaction to the global financial and economic crisis that started in 2008, job creation has become a main priority of EU policy. In this context, ECF has decided to commission academic consultancy Transport & Mobility Leuven to carry out a study that quantifies the contribution of the cycling sector to job creation in Europe. This study has been realised with support from ECF's partners in the Cycling Industry Club. It continues the work that has been initiated by ECF with the report on the cycling economy, estimating the economic benefit of cycling at € 205 bn per year for the EU-27.[1]

So far, investments in cycling have mostly been driven by factors like the need for a more efficient transport system, congestion relief, health benefits or improved access.[2] Employment in the cycling sector has rarely been used as an argument at the international level, except for cycling tourism. The aim of the study is to show that employment in the cycling sector is a co-benefit of investments in cycling, and also a benefit in its own right.

[1] http://www.ecf.com/wp-content/uploads/ECF_Economic-benefits-of-cycling-in-EU-27.pdf
[2] Neun, Manfred [2011a]: Cycling Economy – A wider Frame for Sustainable Investments in Cycling Mobility. Opening speech at Velo-city 2011, Seville. http://www.ecf.com/wp-content/uploads/2011/10/ The-Cycling-Economy.pdf

SUMMARY TABLES

Employment (Full-Time Equivalents) Today

	Bicycle retail + repair	Bicycle manufacturing	Cycling infrastructure	Cycle tourism	Cycle hiring schemes	Cycle logistics	Total
Belgium	1027	509	603	2922	114	n.a.	5175
Bulgaria	295	1447	104	14138	1	n.a.	15985
Czech Republic	1474	940	211	18082	1	n.a.	20708
Denmark	1876	110	603	4782	17	n.a.	7388
Germany	21828	4251	7993	177102	225	n.a.	211399
Estonia	231	13	26	564	0	n.a.	834
Ireland	202	19	97	2254	13	n.a.	2585
Greece	1453	168	511	5153	23	n.a.	7308
Spain	3530	392	685	17432	594	n.a.	22633
France	6126	2297	1264	54288	1000	n.a.	64975
Italy	2865	3350	1429	13792	825	n.a.	22261
Cyprus	75	7	8	137	17	n.a.	244
Latvia	132	7	82	4739	6	n.a.	4966
Lithuania	631	250	113	3332	10	n.a.	4336
Luxembourg	48	2	5	44	17	n.a.	116
Hungary	1873	580	507	49041	5	n.a.	52006
Malta	25	2	4	0	0	n.a.	31
Netherlands	5794	2291	2140	18176	8	n.a.	28409
Austria	1787	354	354	9968	64	n.a.	12527
Poland	3419	1570	1151	36380	132	n.a.	42652
Portugal	892	1190	134	2456	13	n.a.	4685
Romania	2088	1200	684	8633	21	n.a.	12626
Slovenia	1083	129	40	4562	11	n.a.	5825
Slovakia	734	386	130	5922	0	n.a.	7172
Finland	655	165	269	15817	0	n.a.	16906
Sweden	1501	168	620	18548	42	n.a.	20879
United Kingdom	18943	832	783	35788	220	n.a.	56566
EU27	80587	22629	23417	524052	3378	846	654909

Employment Potential (Full-Time Equivalents) with Doubling of Cycling Modal Share

	Bicycle retail + repair	Bicycle manufacturing	Cycling infrastructure	Cycle tourism	Cycle hiring schemes	Cycle logistics	Total
Belgium	2246	723	872	4851	n.a.	n.a.	8692
Bulgaria	1660	2055	346	23470	n.a.	n.a.	27531
Czech Republic	4188	1335	1015	30016	n.a.	n.a.	36554
Denmark	2809	156	773	7937	n.a.	n.a.	11675
Germany	28088	6036	11294	293989	n.a.	n.a.	339407
Estonia	571	18	125	937	n.a.	n.a.	1651
Ireland	667	27	127	3742	n.a.	n.a.	4563
Greece	3955	239	711	8555	n.a.	n.a.	13460
Spain	6391	557	718	28937	n.a.	n.a.	36603
France	5967	3262	1789	90118	n.a.	n.a.	101136
Italy	6335	4757	2149	22894	n.a.	n.a.	36135
Cyprus	102	10	8	228	n.a.	n.a.	348
Latvia	1205	10	348	7866	n.a.	n.a.	9429
Lithuania	1620	355	445	5531	n.a.	n.a.	7951
Luxembourg	63	3	6	72	n.a.	n.a.	144
Hungary	8755	824	1927	81409	n.a.	n.a.	92915
Malta	42	3	3	0	n.a.	n.a.	48
Netherlands	7781	3253	1956	30172	n.a.	n.a.	43162
Austria	1977	502	557	16547	n.a.	n.a.	19583
Poland	9128	2229	5421	60391	n.a.	n.a.	77169
Portugal	1292	1690	138	4077	n.a.	n.a.	7197
Romania	8307	1704	2924	14331	n.a.	n.a.	27266
Slovenia	1369	183	192	7573	n.a.	n.a.	9317
Slovakia	2287	548	595	9831	n.a.	n.a.	13261
Finland	1456	234	395	26257	n.a.	n.a.	28342
Sweden	3648	239	842	30789	n.a.	n.a.	35518
United Kingdom	10287	1181	808	59407	n.a.	n.a.	71683
EU27	122196	32133	36484	869927	6756	1692	1069188

JOBS AND JOB CREATION IN THE EUROPEAN CYCLING SECTOR

Report for: European Cyclists' Federation
Date: 20th of October 2014
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SUMMARY AND CONSIDERATIONS: 650.000 JOBS IN THE EUROPEAN CYCLING SECTOR TODAY, MORE THAN 1.000.000 TOMORROW

1. MAIN FINDINGS

We estimate the jobs in the European cycling sector today at around 650.000 full-time equivalents (EU-27, excluding Croatia). With a doubling of bicycle modal share, the employment potential of cycling jobs represents more than 1.000.000 full-time equivalents.

This study takes into account jobs in the bicycle industry, bicycle retail, bicycle infrastructure and bicycle tourism sector. The table 1 below shows the jobs of the respective sectors today (left) and with a doubling in bicycle modal share (right). We find that bicycle tourism is by far the largest contributor to cycling jobs.

High number of jobs per million of turnover
Table 2 shows that the bicycle sector (left) has significantly higher employment rates than the other transport sector. Per million of turnover, a bicycle manufacturer employs 3 times more people than a car manufacturer.

An opportunity for a more inclusive Europe
The qualitative evaluation of jobs in the bicycle sector shows that a number of them do not require high levels of qualification. By providing easily accessible employment for groups that are disadvantaged on the labour market because of their low qualification levels, this offers an opportunity to contribute to the objectives of an inclusive Europe.

Cyclists are better for the local economy
Another interesting point about (functional) cycling is that it contributes probably more to the local economy than the use of other transport modes. Cyclists go more to local shops, restaurants, cafés or other local businesses than users of other transport modes.

2. CAVEATS

Not all employment in the cycling sector taken into account
The present study only looks at job creation in certain key sectors of the cycling economy. However, in certain sectors there was very limited or no data available on the amount of cycling jobs. For example, for cycling services the amount of jobs that we included could be an underestimate because data on this sector was so sparse. Including data for these fields would increase the total number of jobs and could be the subject of further research.

Furthermore, due to issues of data availability, the newest EU Member State Croatia is not included in this study. For the EU-28, the number of jobs in the cycling sector is therefore probably slightly higher than presented here.

In the manufacturing sector, the job creation effect of doubling the modal share of cycling might be underestimated. The reason for this is that with increasing modal shares, bike prices go up which could imply that cyclists buy less cheap Asian bikes and more bikes which are assembled in Europe. Within the limits of the study, we were not able to investigate trade flows and therefore our numbers will not pick up such an element.

Finally, the study takes only direct effects into account. Indirect effects are not taken into account. An indirect effect is for example the jobs created at the steel or aluminium producer who provides input for the bicycle manufacturer.

Room for improvement of the estimates
This study estimates the gross job effect. It does not account for the fact that if people did not cycle, there could be other jobs replacing cycling employment. The net job effect would take this into account. As a result, the job growth numbers that we indicate for a doubling of bicycle modal share should not be interpreted as indicating a net employment growth numbers for the entire economy. They should be considered as the increase in cycling jobs, whereas jobs in other sectors may diminish in compensation. Nevertheless, our calculations have also shown that job intensity per 1M€ turnover is higher for the cycling economy than for other transport modes.

Also, we want to stress that our estimates for employment growth potential in case of a doubling of bicycle modal share are based on a relatively simple statistical model. We correlate current modal share with cycling economy indicators in a cross-section of EU27 countries, and subsequently use these correlations to estimate the economic impact of increasing modal shares by extrapolation. This approach leaves the room open for statistical problems, such as endogeneity bias, which would imply that we over-estimate the employment effects of increasing modal shares. However, limited data availability and limited resources have motivated the current approach for this study.

The numbers we provide are based on available data and statistics, completed with calculations and analyses. The quality of our estimates are obviously linked to the quality of the data that we use. Quality of available data and statistics greatly vary.

- Data on employment in the manufacturing and retail sector are good.
- Estimates on tourism sector can be improved, especially the link between an increase in modal share and the increase in bicycle tourism.
- Data on current bicycle modal share and growth potential in bicycle use are poor. No consistent time series are currently available in Europe. This means that there is much room for improvement of the estimate of job impacts of an increased modal share of cycling.

TABLE 1: OVERVIEW OF JOBS IN THE CYCLING SECTOR TODAY AND WITH A DOUBLING OF MODAL SHARE

Subsector	Employment (FTE) today	Employment (FTE) with doubling of modal share
Bicycle retail (mainly sales and repair)	80 587	122 196
Bicycle industry (manufacturing and wholesale)	22 629	32 133
Bicycle infrastructure	23 417	36 484
Bicycle tourism	524 052	869 927
Bicycle services	4224	8448
Total	654 909	1 069 188

TABLE 2: JOB INTENSITY COMPARISON BETWEEN BICYCLE SUBSECTORS AND RELATED SECTORS (IN FTE EMPLOYMENT/1M€ TURNOVER, AVERAGE FOR EU)

	Bicycle	Other transport
Manufacturing	4.89	Car: 1.63 Ships and boats: 4.07 Air and spacecraft: 3.9
Sales + accessories sale	5.42 (without adjustment) 8.13 (with adjustment[3])	Motor vehicles: 1.92
Repair	5.23	Motor vehicles: 7.59
Infrastructure	Cycle-specific: 7.33	General: 5.73

[3] This adjustment factor is explained in section 5.2.

INTRODUCTION

This study makes a research-based assessment of the economic value of the cycling sector for the European economy, focusing on jobs and employment. This study is one of the first to undertake the challenge of quantifying cycling jobs at the European level. We take into account multiple cycling-related activities such as bike retail, bicycle manufacturing, bike infrastructure investment, cycle tourism and bicycle services. In this study, we quantify the full-time equivalent number of jobs. This is consistent with common practice in computing employment impact of economic policy measures.

A number of recent studies have quantified job impact of cycling at a national or at regional level:

- Ferri & Lopez Quero (2010). La generación de empleo en el transporte colectivo en el marco de una movilidad sostenible.
- ZIV/VSF (2013). Die Welt des Fahrrads in Zahlen.
- LSE (2011). The British cycling economy: Gross cycling product report.
- ATOUT France (2009). Economie du vélo.
- TML & Pro Velo (2014). Evaluation économique de la pratique du vélo en Wallonie.
- TML & Pro Velo (2014). Impact en potentieel van fietsgebruik voor de economie en de werkgelegenheid in het Brussels Gewest.

We use these reports in two ways in our study: as data input for our estimations and as a cross-check to assess the quality of the numbers that we obtain.

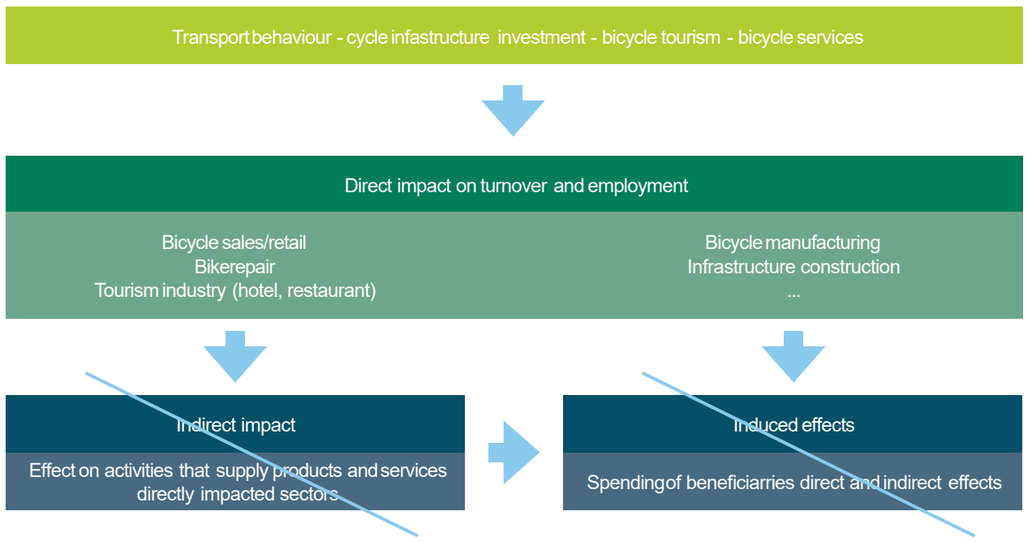
Our calculations are further based on European statistics on cycling modal share, cycling sector turnover and employment:

- EuroVelo (2012). The European cycle route network.
- COLIBI (2013). The European bicycle market: Industry and Market Profile.
- ECF (2013). Funding cycling infrastructure: Time for national authorities to step up.
- WHO (2014). Jobs in green and healthy transport.
- Eurostat. Structural Business Statistics: European sector statistics on turnover and employment
- Gallup (2011). The future of transport: Flash Eurobarometer Report, European Commission.

The scope of our study is EU27[4]. We use recent statistics (2009-2014), but we cannot pin down one single year. Because of limited data availability, we use the statistics that are available in recent studies or databases. The numbers we use are thus generally well comparable, because there have been no sudden shocks in recent years. Where possible, we use data from different sources in calculating a single indicator. This enhances the reliability of our calculations.
Our study focuses on the direct employment impact of the cycling economy. We do not compute indirect or induced jobs from investing in the bicycle economy[5]. Our estimates can therefore be considered as a lower bound estimation.
The difference between various impacts is represented in Figure 1.

- We define direct impact as the turnover and employment which is directly related to cycling activities. These are, for example, the salespersons who sell and repair bicycles in specialized shops, the bicycle manufacturing industry, the construction companies that build the bicycle infrastructure, etc.
- Indirect impact is defined as the turnover and employment realized in the sectors that supply products and services to the sectors that directly benefit from cycling expenditures. For example, the steel or aluminum producer furnishes steel or aluminum to the cycle manufacturer.
- Induced effects are those economic impacts (generally: additional growth) that result from the additional spending by beneficiaries of direct and indirect impacts. The bike repairer gains more money as he repairs and sells more bicycles. He will buy other things with it and create jobs and turnover in other sectors.

FIGURE 1: ECONOMIC IMPACT OF CYCLING ECONOMY



We only focus on direct effects in this study. We do not take indirect effects and induced effects into account. One can thus interpret the numbers that we provide as a lower bound on the cycling jobs estimate.

This report is structured in three main chapters. In chapter 3, we report the importance of the European cycling economy by turnover or investment. We further calculate the number of full time equivalent jobs related to cycling activities in Europe. In chapter 4, we develop an ambitious growth scenario with doubling of bicycle modal share by 2020 and calculate its employment impact. In chapter 5, we discuss qualitative aspects of cycling jobs and other insights that can qualify our results. Elements we discuss are:

- the distinction between gross employment growth and net effects
- job intensity in the cycling sector in comparison to related sectors (such as the car industry)
- average quality of cycling jobs

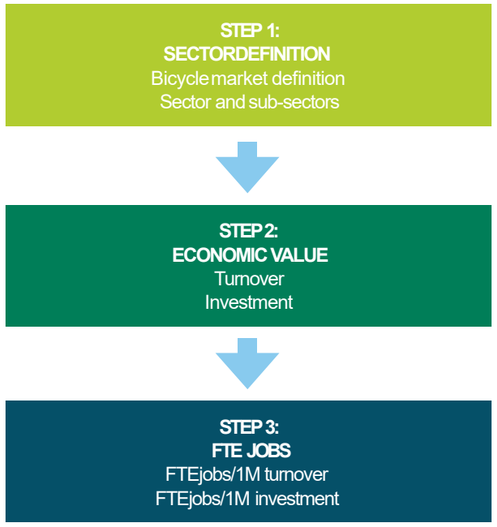
CURRENT LEVEL OF CYCLING JOBS

In this chapter, we explain our methodological approach in calculating the current number of jobs due to cycling activities in Europe. Next, we provide an overview of our results at an aggregated, European level. We include a more detailed overview of results at the country level in Annexes I-V (see http://tinyurl.com/cycling-jobs).

1. APPROACH & GLOBAL RESULT

The figure below illustrates our approach. The text clarifies it further.

FIGURE 2: ILLUSTRATION OF THE METHODOLOGICAL APPROACH



Step 1: Definition of 5 subsectors

We divide the cycling economy into five subsectors:

1. Bicycle retail
2. Bicycle production
3. Bicycle infrastructure
4. Bicycle tourism
5. Bicycle services

Step 2: Calculate sector turnover & Step 3: Calculate employment related to turnover

For each of these subsectors we calculate the economic value by turnover, with the exception of bicycle infrastructure for which we use investment as the main indicator. We translate turnover into Full Time Equivalent jobs, based on the FTE/turnover ratio that we find in the Eurostat Structural Business Statistics. The statistics are available for a number of sectors following the NACE (Statistical Classification of Economic Activities in the European Community) sector classification. We select the NACE codes that contain bicycle related activities as illustrated below. For example, we use the NACE3092 ratio for the manufacture of bicycles.

- NACE3092 Manufacture of bicycles and invalid carriages -> Manufacture of bicycles
- NACE4211 Construction of roads and motorways ->Bicycle infrastructure
- NACE4649 Wholesale of other household goods ->Bicycles and their parts and accessories wholesale
- NACE4764 Retail sale of sporting equipment in specialized stores ->Pedal cycles retail, cycle accessories dealer retail, cycle agent retail
- NACE49 Land transportation ->Transportation for cycle tourism
- NACE55 Accommodation ->Cycle tourism expenditure
- NACE56 Food and beverage ->Cycle tourism expenditure
- NACE7721 Renting and leasing of recreational and sports goods ->Bicycle hire

[4] We do not include Croatia due to reasons of limited data availability.
[5] For this, a more elaborate input-output analysis would be necessary. However, this is difficult given the discrepancy between the cycling economy and the existing NACE sector classification.

• NACE9529 Repair of other personal and household goods ->Repair of bicycles

The selected sectors are broader than only bicycles. We will therefore make adjustments to the FTE/turnover ratios where appropriate and when available data allows us to do so. We will also cross-check the results that we obtain with those from national studies. We can thus summarize our methodology as follows:

Global result: 650 thousand full-time equivalent jobs related to bicycle economy in Europe

We give a brief overview of the totals on European turnover, investment and cycling jobs in Table 3. We find that current FTE employment in the cycling economy amounts to 654 909.

TABLE 3: OVERVIEW OF KEY RESULTS ON TURNOVER AND EMPLOYMENT IN DIFFERENT CYCLING SUBSECTORS

Subsector	Turnover/investment (1000€)	Employment (FTE number)
Bicycle retail (mainly sales and repair)	8 457 720	80 587
Bicycle industry (manufacturing and wholesale)		22 629
Bicycle infrastructure	3 193 087	23 417
Bicycle tourism (accommodation and restaurants)	42 460 000	524 052
Bicycle services (hire schemes and cyclelogistics)		4224
Total		654 909

2. RESULTS FOR VARIOUS SUB-SECTORS

Bicycle retail: bike sales, bike accessories and bike repair

We divide the cycling economy into five subsectors:
In the subsector of bicycle retail, we distinguish between bicycle sales, bicycle accessories sales and bike repair. We apply the general methodology to the three subsectors, thus applying the most appropriate FTE/turnover on the turnover of the sectors.

Turnover: deduction via European sector organisation of bicycle manufacturers (COLIBI) and national studies

We use the turnover numbers on bike sales from the COLIBI report 'The European bicycle market: Industry and market profile'.

We estimate the turnover on accessories sales and bike repair based on indicators developed in earlier studies. In the studies by TML & Pro Velo (2014) for Brussels and Wallonia, and in the Grous (LSE,2011) report on the British cycling economy, the joint turnover of bike accessories sales and bicycle repair was estimated at around 50% of the turnover from bike sales:

- TML & Pro Velo estimated the consumer expenditures on bike accessories sales to be around 35% of the expenditures on bike sales. The expenditures on bike repair were estimated at 15% of bike sales turnover. These numbers are based on a survey of around 1600 respondents among bicycle users in the region.
- Grous (LSE,2011) has computed the turnover from bike repair and bicycle accessories sales for the UK economy at around 50% of the value of bicycle sales.

FTE/turnover ratio based on sector numbers from NACE 4764 and 9529

We use the ratio on the number of full-time equivalents/1M turnover from the following two NACE sectors:

- NACE4764 Retail sale of sporting equipment in specialized stores ->Pedal cycles retail, cycle accessories dealer retail, cycle agent retail
- NACE9529 Repair of other personal and household goods ->Repair of bicycles

The NACE sector definition is broader than just bicycle retail and bicycle repair. Therefore, we adjust the FTE/turnover rates where possible to make them more specific to cycling related economic activities.

Total full-time equivalent jobs in bike retail

Table 4 presents an overview of turnover and employment in the bike retail subsector and its various sub-components.

In Annex I (see http://tinyurl.com/cycling-jobs), we give a more detailed national-level overview of turnover and employment related to bicycle retail. These national indicators allow us to validate our numbers using results from national studies (the ones we mentioned earlier). From the cross-checks that we perform, we can conclude that our FTE estimates are quite well in line with previous estimates and are on the conservative side.

Bicycle sales: some details

We start from the COLIBI(2013) report on "European bicycle market, 2013 edition: Industry & market profile". The report contains information on number of bicycles sold per country and average price per bicycle sold (incl. VAT). These numbers

TABLE 4: OVERVIEW OF TURNOVER REALIZED AND FTE EMPLOYMENT FOR THE EU IN THE SUBSECTOR OF BICYCLE RETAIL

Sub-subsector	Turnover (1000 €) EU	FTE employment EU
Bicycle sales	5 638 480	50 696
Bicycle accessories sale	1 973 468	17 744
Bicycle repair	845 772	12 147
Total bike retail	8 457 720	80 587

allow us to compute the revenue from bicycle sales excluding VAT[6]. The estimated turnover from bike sales in EU27 is € 5 638 480 000.

We then apply the national rates on FTE employment per 1M turnover for the sector 'NACE4764 Retail sale of sporting equipment in specialized stores'. We obtain an FTE/1M turnover rate for the entire sector in France of 4.05. The ATOUT France study (Mercat, 2009) reports an FTE/1M turnover rate of 6.1 specifically for bicycle retail. This ratio allows us to adjust the FTE/turnover rates for all countries, through a multiplication of *6.1/4.05. As a result from this, we have an array of FTE/turnover ratios for each European country. We find relatively large discrepancies between European countries, with the ratio ranging from 4.4 FTEs/1M turnover for Belgium to 37.63 FTEs/1M turnover for Lithuania. The average ratio for the EU27 is 7.9 FTEs/1M turnover.

We multiply the national turnover with the national FTE/turnover ratios and obtain the figures on employment related to bicycle sales per country. For EU27, we find a total number of jobs for bicycle sales of 50 696 FTEs. We give a more detailed overview of our results in Annex I (see http://tinyurl.com/cycling-jobs).

Bicycle accessories sale: some details

We estimate the turnover from bike accessories sales as 35% of the turnover realized from bicycle sales following the TML – Pro Velo survey (2014). This leads to a turnover from bicycle accessories sale of € 1973 468 000 for EU27.
We apply the same FTE/turnover ratios for bicycle accessories sale as for bike sale. Both activities fall under NACE 4764. This gives us a an estimated yearly employment of 17 744 FTEs in EU27. We show more detailed results at country level in Annex I (see http://tinyurl.com/cycling-jobs).

Bicycle repair: some details

We estimate revenues from bicycle repair at 15% of turnover realized from bike sales. This percentage is based on the TML – Pro Velo study (2014) for Wallonia and is also in line with the Grous/LSE(2011) 'British cycling economy' study. This gives us an EU27 turnover for bicycle repair of € 845 772000. The FTE/turnover ratios are those from the NACE9529 sector 'Repair of other personal and household goods'. We apply the same adjustment factor as we have done for bicycle (accessories) sales and also multiply the NACE9529 FTE/1M turnover rates by 1.5. Intuitively, we expect labor intensity to be higher for bike repairs than for bike sales. Without adjustment factor, this would not be the case. After adjustment, the average FTE/1M turnover ratio for EU27 is 11.76. Belgium has the lowest ratio with 5.23 FTEs/1M turnover and 121 FTEs/1M turnover in Bulgaria is the highest ratio.

We find a yearly employment of 12147 FTE jobs in bike repair by multiplying the estimated turnover with the FTE/turnover ratio. More detailed results per country are shown in Annex I (see http://tinyurl.com/cycling-jobs).

Bicycle industry

Manufacturing jobs

The most important input for computing FTE jobs in bicycle industry is the "Bicycle industry and market profile" report produced by COLIBI(2013). This report gives a yearly estimate of employment in bicycle manufacturing and bicycle parts manufacturing.

Adding wholesale employment

To this, we add an estimate of FTE jobs created in the distribution/wholesale activity. Ekosgen(2010) estimated that around 843 persons were employed in the bicycle industry sector in the UK in 2008. Comparing this employment number with the number of jobs in the COLIBI(2013) report, we find that 700 employees are not represented in the COLIBI numbers. Ekosgen(2010) further indicates that a large share of industry jobs is in the area of wholesale of bicycles. We also learn from the COLIBI(2013) that the UK is one of the countries with the largest discrepancy between bike sales and bicycle production, with relatively small production in comparison to much higher sales numbers.

In calculating the number of bicycle wholesale jobs, we assume that employment in distribution and wholesale of bikes is linearly related with the import need of a country. The underlying assumption is that local producers deliver directly to a bike retailer without passing via a wholesale center. Imported bicycles will more often go to an importer/wholesale center first and then be distributed to retailers.

So we use the information from the UK to estimate employment in wholesale activities. We obtain an estimate of 1FTE job in wholesale and distribution per 5000 imported bikes. Combining the COLIBI data on bicycle manufacturing with the calculated numbers on FTE wholesale jobs, we obtain the aggregate number of FTE jobs in the European bike industry as shown in Table 5.

We provide a more detailed overview for FTE's per country in Annex II (see http://tinyurl.com/cycling-jobs). We again validate our results with employment numbers obtained in earlier national studies. We find that our estimate of FTE employment in the bike industry is somewhat conservative but that it is in line with results from previous studies.

Bicycle infrastructure

Investment figures instead of turnover

We use investment, rather than turnover, as the starting point for our FTE estimation in the sector. We then apply an employment/investment rate to estimate number of full-time equivalents active in cycling infrastructure. For this, we use indicators from the NACE 4211 sector 'Road construction' and apply an adjustment factor to represent bicycle-specific investment.

Based on national studies and observed relationship with modal share

In estimating the number of FTE jobs in bicycle infrastructure, we use the observation that investment in cycling infrastructure per capita is generally in line with a country's cycling modal share. This observation has been made in a number of studies on the topic such as:

- UNEP (2010). Share the road: Investment in walking and cycling road infrastructure.
- Alliance for Biking & Walking (2014). Bicycling and walking in the United States: 2014 benchmarking report.
- ECF (2013). Funding cycling infrastructure: Time for national authorities to step up!

Adaptation for Eastern European countries

However, we have to take into account the observation by the ECF (2013), that investments in cycling infrastructure are considerably lower in Eastern European countries. The study points to the example of Hungary with a bicycle modal share of around 19% and only 3€/cap in annual cycling infrastructure investment.

We are able to estimate bicycle infrastructure investment/person for all European countries using the observed correlation between bicycle modal share and investment. We start from information on investment/person from a number of national studies. Table 6 gives an overview of the information that we use for our estimation.

For Western European countries, we will directly use the investment per person obtained. For Eastern European countries, we take into account that bicycle infrastructure is often less developed and financed (as demonstrated by the numbers for Hungary in Table 6). Thus, the estimates of investment per capita for Eastern European countries are the numbers that we obtain from our model, divided by three. This gives us the amounts of investment per person. We find total investment per country by multiplying this number with population per country.

FTE/investment ratio: adjustment of ratio for NACE sector 4211 'Construction of roads and motorways'

We calculate the effect of infrastructure investment on employment using the FTE/1M investment ratio from NACE sector 4211 'Construction of roads and motorways'. We adjust the FTE rate that we obtain to make it specific to cycling infrastructure. We use input from a study conducted at the University of Massachusetts called 'Pedestrian and bicycle infrastructure: A national study of employment impacts' (Garrett-Peltier, 2011). This study has calculated that direct employment effects of bicycle infrastructure projects is somewhat higher than for an average construction project (by a factor 1.28). Hence, we take the NACE 4211 FTE/investment rates and we multiply the coefficients by 1.28 to make the coefficient specific to cycling infrastructure.

TABLE 5: FULL-TIME EQUIVALENT EMPLOYMENT IN THE EUROPEAN BICYCLE INDUSTRY

EU Countries	FTE bicycle manufacturing	FTE parts and accessories manufacturing	FTE distribution/ wholesale	FTE total
EU27	13 319	7207	2103	22 629

TABLE 6: BICYCLE MODAL SHARE AND INVESTMENT IN BIKE INFRASTRUCTURE/PERSON FOR A NUMBER OF COUNTRIES/REGIONS IN EUROPE

Country/region	Investment cycling infr (1000€)	Population	Modal share[7]	Inv/cap (€/person)	Source of inv/cap
Flemish region	120 500	6 350 000	15%[8]	17	Ontwerp Vlaams Totaalplan Fiets (2002)
Denmark			19.0%	18	UNEP (2010). Share the road: Investment in walking and cycling road infrastructure
Germany			13.0%	10.452	UNEP (2010). Share the road: Investment in walking and cycling road infrastructure
Netherlands	487 000	16 805 000	26.0%	28.98	Fietsberaad-CROW (2010)
UK			2.0%	2.4	ECF (2013). Funding cycling infrastructure
Hungary			19.0%	3	ECF (2013). Funding cycling infrastructure

FTE calculation

We compute full-time equivalent jobs associated with bicycle infrastructure investment by multiplying the annual investment in cycling infrastructure per country with the adjusted FTE/investment rates. We find that the aggregate impact at the European level is : table 7.

We provide more detailed country-level numbers in Annex III (see http://tinyurl.com/cycling-jobs). We validate our figures with numbers from existing national studies. Our results on full-time equivalent jobs are in line with the studies for Germany and for Belgium's Wallonia region. Our figures for France and UK are below the employment numbers found in the national studies. We conclude that our results are in line with other studies or are somewhat on the conservative side.

Bicycle tourism

The EuroVelo (2012) study on "The European cycle route network" contains a demand model on cycle tourism and related spending. This model is based on national data and data from case studies on cycle tourism and day excursionists. The model produces country-level estimates of turnover realized by cycle tourists. The turnover is divided into overnight tourist trips and tourism daytrips. These estimates are the base for our calculations.

FTE ratio: Assumptions on tourism spending

We make a number of assumptions on spending by overnight tourists and daytrip tourists to transform turnover into number of jobs. These assumptions are based on insights from the EuroVelo study into expenditures by different categories of cycle tourists.

We assume that overnight cycle tourists spend:

- 40% of their expenses on accommodation – NACE55 Accommodation
- 30% of their expenses on food and beverages – NACE56 Food and beverages
- 15% of their expenses on transportation – NACE49 Land transportation
- 15% of their expenses on bicycle equipment – NACE4764 Retail sale of sporting equipment in specialized stores
  - 10% comes from sale of bikes or bike accessories
  - 5% comes from renting bikes or bike accessories

We further assume that daytrip cycle tourists spend:

- 60% of their expenses on food and beverages – NACE56 Food and beverages
- 20% of their expenses on transportation – NACE49 Land transportation
- 20% of their expenses on bicycle equipment – NACE4764 Retail sale of sporting equipment in specialized stores
  - 12.5% comes from sale of bikes or bike accessories
  - 7.5% comes from renting of bikes or bike accessories

The FTE/turnover rates for overnight cycle tourists and daytrip cycle tourists are a weighted average of the FTE/turnover rates of the NACE sectors as specified above. Notice that we do not include the turnover figures for bike sales or sale of bike accessories. The reason is that this turnover has already been accounted for in section 3.2.1 on bike retail. In order to avoid double counting, we have to exclude the impact of tourism on bike retail from the current calculation.

Full-time equivalent jobs in cycle tourism

We multiply the national revenue figures from cycle tourism by the FTE/turnover rates. We do the multiplication separately for overnight cycle tourists and daytrip cycle tourists. Then, we take the sum of the FTEs from both types of cycling travel to calculate the total employment related to bicycle tourism. Table 8 gives an overview of the results for Europe.

We provide more detailed results per country in Annex IV (see http://tinyurl.com/cycling-jobs). We also validate our results by comparing them to results from national studies in Germany and France. We observe that our FTE figures are in line with those from an earlier German study and are considerably higher than the numbers from the French national study.

TABLE 7: FULL-TIME EQUIVALENT NUMBER OF JOBS IN EUROPE FROM BICYCLE INFRASTRUCTURE INVESTMENT

EU Countries	Est. yearly investment (1000 €)	FTEs/1M investment (NACE 4211, Eurostat SBS)	Adjusted FTEs/1M investment	Jobs associated with cycling infrastructure
EU27	3 193 087	5.73	7.33	23 417

TABLE 8: 8 FULL-TIME EQUIVALENT NUMBER OF JOBS IN EUROPE FROM CYCLING TOURISM

EU Countries	Turnover cycle tourism overnight (1000 €)	FTE overnight cycle tourism	Turnover cycle tourism daytrips (1000€)	FTE cycle tourism daytrips	Total FTE cycle tourism
EU27	8 650 000	105 211	33 810 000	418 842	524 052

[6] For VAT deduction, we use data from DGTAXUD (2014) on national VAT rates: 'VAT rates applied in the member states of the European Union'. The report is available at: http://ec.europa.eu/taxation_customs/resources/documents/taxation/vat/how_vat_works/rates/vat_rates_en.pdf

[7] All the data on national data on bicycle modal share is based on: Gallup (2011) Future of transport. Flash Eurobarometer Report. European Commission, 2011.

[8] Modal share for Flemish Region is from Zwerts & Nuyts (2002). Onderzoek verplaatsingsgedrag Vlaanderen.

Bicycle services

Due to limited data availability on the economic value of the bicycle services sector in general, we focus on two specific activities that generate jobs: employment related to municipal bicycle hire schemes and employment from cycle logistics services.

For bicycle hire schemes, our estimates are based on a number of earlier studies and on feedback that we received from experts on bike sharing from the VeloCitta project[9]. For cycle logistics services, we use input from the cycle logistics federation on the importance of the sector and from the 'La Petite Reine' initiative on the job intensity of these activities. The estimates could be refined once more data is available on this emerging market sector.

Number of bikes shared through bicycle hire schemes

Instead of turnover or investment amounts, we will express the economic importance of bicycle hire schemes in different countries by the number of bikes shared. The numbers of bikes shared per country are largely based on statistics that we obtained from the 'world bike sharing map'[10]. These numbers have been validated by experts working on the VeloCitta project from DTV consultants and Velo Mondial.

Employment per 1000 bikes shared

A small number of research papers have studied the employment impact of bicycle sharing schemes. We use the limited data available to develop an estimate of the FTE jobs per 1000 bikes shared.

We find some discrepancy between the numbers from various municipalities. We decide to take a rate of 20 FTEs/1000 bikes for sharing schemes in Western European countries. We find that the most recent study done for France, which finds about 650 jobs for 46,000 bikes in sharing schemes (ca. 14.1 jobs/1000 public bikes), is largely in line with this estimate.[11] We further use an estimated rate of 33 FTEs/1000 bikes for sharing schemes in Southern European and Eastern European countries. The difference in FTE/economic value between Western Europe and Eastern-Southern Europe is in line with employment rates that we observed for other sectors. The job impact of a specific turnover amount is consistently higher in Eastern European countries. This could be explained by lower labour costs giving incentives to use human workforce rather than automated systems. For example, the Romanian bike share system "i'velo" launched by ECF member "Green Revolution Association", uses manned bike stations instead of automatic docking stations.[12]

Full-time equivalent jobs from bicycle sharing

Table 10 summarizes our results for EU27. We start from the observation that 136000 bikes are shared in Europe. This is based on expert input on bicycle sharing from DTV consultants[13] and Velo Mondial[14] who are leading an ongoing research project on bicycle sharing schemes in Europe (VeloCitta[15]). It is also based on information obtained from the world bike sharing map[16]. We estimate that this bike sharing activity generates around 3378 full-time equivalent jobs.

Adding employment from cycle logistics services

The European Cycle Logistics Federation (www.cyclelogistics.eu) has launched a survey among its members. This survey indicates that the sector generates a total yearly turnover of around € 22 million per year. Transport for London has conducted a scoping study on cycle freight[17]. In this study, they used the example of 'La Petite Reine' project in France, that sustains 50 employees with a turnover of € 1.3 million yearly. Using these numbers, we obtain an indicative estimate of 846 full-time equivalent jobs thanks to cycle logistics in Europe. We add this number to the estimate for bike sharing and obtain an estimated 4224 FTE jobs thanks to bicycle services in Europe.

There are some indications that this number might be an underestimate. There are some service sectors linked to cycling – consultancies, education or NGOs to name just a few – not taken into account in this study. Adding them to the employment account could be the subject of further research.

TABLE 9: CASE STUDIES ON JOB IMPACT OF MUNICIPAL BICYCLE SHARING SCHEMES

City	Public bicycles	Jobs	Jobs/1000 public bikes	Source
Barcelona	6000	200	33.33	Ferri & Lopez Quero (2010)
Brussels	3650	30	8.22	Economic impact of cycling in Brussels (2014)
Paris	20000	400	20	ATOUT France (2009)
Lyon	4000	60	15	ATOUT France (2009)
London	11000	250	22.72	VeloCitta (2014)

TABLE 10: FULL-TIME EQUIVALENT EMPLOYMENT FROM BICYCLE SHARING IN EUROPE

EU Countries	Public bikes shared	Jobs/1000 public bikes	FTE jobs from bike sharing schemes
EU27	136 238	24.79	3378

JOB POTENTIAL OF CYCLING WITH INCREASE IN BICYCLE MODAL SHARE

In this section, we explore the potential effect on job creation of a doubling in bicycle modal share. We will first explain our methodology and give a summary of the global job impact at the level of EU27. Then, we give a more detailed overview of our calculation for a number of subsectors:

- The sector of bicycle retail
  - Sales of bikes
  - Sales of bike accessories
  - Bike repair
- The sector of bicycle industry
  - Bicycle production
  - Bike accessories production
  - Bike wholesale
- Sector of bicycle infrastructure
  - Construction
- Sector of bicycle tourism
  - Overnight tourism
  - Day tourist trips
- Sector of bicycle services
  - Bike sharing
  - Bicycle logistics

1. APPROACH & GLOBAL RESULT

We first provide some detail on our bicycle growth scenario. We express the implication of the growth scenario as an increase in bicycle modal share. This share is based on a study by Gallup (2011) on "the future of transport". This study is a representative survey of the European population (at the national level), in which bicycle modal share is expressed as the share of respondents who indicate that the bicycle is their main mode of transport that they use for daily activities. There are other, more common ways to express the share of a transport mode, such as the share of trips or the share of distance travelled (vkm) per mode. However, this data is not available at the Europeanlevel and we will therefore use the data from Gallup in this study.

One of our main observations is that data on bicycle modal share at the national level is very scarce. There is more availability of modal share statistics at the city level[18], but this is not suitable for our study. Eurostat does collect data on the modal split for transport of passengers and freight in terms of distance covered (vkm). However, the bicycle is not included as a transport mode in these statistics. We recommend an improvement in the availability of statistics on bike use and, in particular, on the modal share of bicycle transport in terms of number of trips or distance travelled. This could be collected by Eurostat as part of their modal split database and would be an important step to evaluate policies to promote cycling in the future.

We evaluate what would be the employment effect of a doubling in bicycle modal share. Table 11 shows the current modal shares and the modal shares that would be attained in a bicycle growth scenario. The European bike modal share average has indeed doubled in the growth scenario, in comparison to the current modal shares. The weights for calculating the average are given by the % of all road traffic (in vehicle-kilometers) of each country.

We define different growth rates for each country because it is easier to double modal share in countries where the modal share is currently very low; for example in Cyprus the modal share only needs to increase by 1% to achieve a doubling whereas in Netherlands modal share would have to increase by 31% to the very high level of 62%. For this reason, we set the growth potential for bike use in each country inversely related to its current modal share[19]. We show the resulting bicycle shares in the growth scenario in the third column of Table 11. You will see in this table that countries with a relatively low modal share (such as Bulgaria or Cyprus) have more than doubled that share in the growth scenario, whereas countries with a high modal share (such as Netherlands or Denmark) have not doubled their modal share. The weighted average bicycle modal share in the growth scenario is 15.3% for EU27. This is exactly the double of the current modal share. Please note that these numbers are derived from an estimate of how a doubling of modal share in the EU27 could be split between Member States. It does not indicate how modal share will actually evolve in these countries.

We study the economic implications of an increase in bicycle modal share on FTE jobs, following a similar approach as in chapter 3. This means that we translate increasing modal share into turnover growth (or investment growth for the subsector of bicycle infrastructure). Then, we translate turnover or investment into employment using the FTE jobs/turnover rates of the relevant sectors.

We provide a brief overview of our results in Table 12. We find an employment effect of around 415000 FTE jobs following a doubling of bicycle modal share. Results are detailed below.

[9] This is a project which aims to develop a knowledge base to further develop and promote the effective implementation of municipal bicycle hire schemes. The project is led by DTV consultants.
[10] As developed by Paul De Maio, available at: https://maps.google.com/maps/ms?msa=0&msid=214135271590990954041.00043d80f9456b3416ced&dg=feature
[11] Direction générale de la compétitivité de l'industrie et des services: Etude sur les marchés de la location de cycles: Quelles opportunités pour les fabricants? http://www.entreprises.gouv.fr/files/files/directions_services/etudes-et-statistiques/etudes/industrie/marches-location-cycles-quelles-opportunites-pour-fabricants.pdf
[12] http://www.greenrevolution.ro/Proiecte/i-love-velo/
[13] www.dtvconsultants.nl
[14] www.velomondial.net
[15] http://ec.europa.eu/energy/intelligent/projects/en/projects/velocitta
[16] Established by Paul De Maio: https://maps.google.com/maps/ms?msa=0&msid=104227318304000014160.00043d80f9456b3416ced&dg=feature
[17] https://www.tfl.gov.uk/cdn/static/cms/documents/cycle-as-freight-may-2009.pdf
[18] See, for example, the EPOMM database http://www.epomm.eu/tems/compare_cities.phtml
[19] We use an exponential transformation of current modal share to be specific. This means that the difference in growth rate between countries with a low modal share and a country with modal share of 16% (the middle of 31% and 1%) is larger than the difference in growth rate between a country with 16% modal share and the Netherlands.

2. RESULTSFOR VARIOUS SUB-SECTORS

Our results are largely based on statistical relationships between bicycle modal share and current expenditures on bikes (per capita). We identify this relationship using a cross-section of modal share data of European countries, in current years. We would like to stress that this statistical methodology can be considered as exploratory and this is caused by the limited availability of data. If better data existed, we could estimate a more robust statistical model. Currently some of the results could be driven by an endogeneity bias. For example, it could be the case that in middle-income countries, people cycles less and also buy less expensive bikes than in high-income countries. The relationship that we identify between bike modal share and price of bikes could then actually be driven by an underlying relationship between income and frequency of cycling, combined with a relationship between income and price of bike equipment sold. We could discard such endogeneity bias if we would have more data at our disposal to estimate better statistical models. Our methodology is thus rather exploratory than confirmatory. For this reason, we recommend that our results should be interpreted with caution.

Bicycle retail: sales, accessories and repair

We investigate the relationship between bicycle modal share, the average price per bike sold and the amount of bicycles sold per capita (taken from COLIBI, 2013). We first estimate a simple statistical model on the relationship between bicycle modal share and average price per bike sold using data on the current modal share and average price per country. We express the average price per bike excluding VAT and in purchasing power parity units, to correct for differences in relative prices and living standards between countries. We fit a linear curve on this relation to estimate the correspondence between modal share and the average price of a bike. Figure 3 gives a graphical overview of the estimated relationship. We observe that the linear relationship does perform well in explaining the upward trend between modal share and price per bicycle.

TABLE 11: OVERVIEW OF BICYCLE MODAL SHARE IN TERMS OF % OF TOTAL TRIPS (TWO LAST COLUMNS ARE USED TO CHECK THAT EU27 WEIGHTED AVERAGE OF POTENTIAL MODAL SHARE IS INDEED DOUBLE THE CURRENT MODAL SHARE)

EU Countries	Current modal share	Growth modal share	%EU traffic	vkm - all road (TREMOVE)
Belgium	13.0%	25.6%	2.40%	93 298
Bulgaria	1.9%	5.1%	0.60%	23 417
Czech Republic	7.1%	16.5%	1.47%	56 895
Denmark	18.9%	32.4%	1.32%	51 413
Germany	13.0%	25.6%	19.39%	752 695
Estonia	5.0%	12.5%	0.24%	9 371
Ireland	3.1%	8.0%	0.83%	32 339
Greece	3.1%	8.0%	1.90%	73 871
Spain	1.9%	5.1%	8.59%	333 407
France	3.1%	8.0%	14.17%	550 048
Italy	5.0%	12.5%	15.22%	591 109
Cyprus	1.0%	2.7%	0.11%	4 339
Latvia	8.1%	18.2%	0.36%	13 938
Lithuania	5.0%	12.5%	0.75%	28 955
Luxembourg	1.9%	5.1%	0.20%	7 853
Hungary	18.9%	32.4%	0.90%	34 809
Malta	1.5%	4.1%	0.03%	1 215
Netherlands	31.0%	37.3%	3.74%	145 305
Austria	8.1%	18.2%	1.51%	58 803
Poland	9.0%	20.3%	4.69%	182 243
Portugal	1.9%	5.1%	1.72%	66 772
Romania	5.0%	12.5%	1.44%	55 745
Slovenia	7.1%	16.5%	0.45%	17 301
Slovakia	9.9%	21.7%	0.83%	32 376
Finland	13.0%	25.6%	1.54%	59 902
Sweden	17.1%	30%	2.19%	84 884
United Kingdom	1.9%	5.1%	13.40%	520 307
EU27	7.64%	15.3%	100.00%	3 882 610

We also estimate a linear relationship between modal shares and number of bikes sold per capita. Again, we use current data on modal shares and bicycle sales figures per country in our estimation. We express bicycle sales per capita; per 1000 inhabitants to be specific. Figure 4 shows the relationship graphically. Number of bikes sold per person is increasing with modal share, but at a lower rate than the average price per bicycle.

We will now use the results of the statistical models to predict the price per bike and the amount of bikes sold in the bike growth scenario. With these numbers, we can easily calculate the turnover of bicycle sales per country in the growth scenario. The turnover is given by the following formula:

$$\textit{Turnover per country} = \textit{av price per bike}_{ppp} * ppp * \left(\frac{\textit{bikesales}}{\textit{1000 pers}}\right) * \textit{inhabitants}$$

The average price per bike in 'purchasing power parity' units and the number of bikes sold per 1000 inhabitants are the outputs of our statistical models. The purchasing power parity units per country and the inhabitants per country originate from Eurostat.

We remark that an advantage of the method used is to avoid making particular assumptions on the fact that more people start to cycle or existing cyclists intensify their cycling, or people do relatively less or more cycling for leisure.

From now on, we can use the same methodology in calculating bicycle retail employment as we have done in chapter 3. We first assume that turnover in sale of bike accessories is around 35% of the turnover in the sales of bicycles, in line with chapter 3. This assumption is based on the calculations from TML/Pro Velo (2014). We further assume that turnover in bike repair is around 15% of the turnover for bicycle sales. We obtain estimations on the turnover made in the European bicycle retail sector, as shown in Table 13.

TABLE 12: OVERVIEW OF KEY RESULTS ON JOB CREATION FOLLOWING AN INCREASE IN BICYCLE MODAL SHARE (GROWTH SCENARIO: MODAL SHARE +50%)

Subsector	Employment (FTE) current scenario	Employment (FTE) growth scenario	Employment difference
Bicycle retail (mainly sales and repair)	80 587	122 196	41609
Bicycle industry (manufacturing and wholesale)	22 629	32 133	9504
Bicycle infrastructure	23 417	36 484	13067
Bicycle tourism	524 063	869 927	345 864
Bicycle services	4224	8448	4224
Total	654 909	1069 188	414 279

Our estimate on the impact of a doubling in bike modal share is an increase in turnover of around 42% for bicycle retail. People will buy more bikes and more expensive bikes when they cycle more, but the increase will not be proportional. This means that the increase in bike sales would be lower than the increase in modal share.

Subsequently, we compute the effect on jobs. The results are shown in Table 14. We find that the job impact of an increase in modal shares is slightly higher than the turnover impact. In absolute terms, we obtain an increase of 41609 full-time equivalent jobs in European bicycle retail if cycling modal share doubled.

In Annex VI (see http://tinyurl.com/cycling-jobs), we include more detailed employment estimates in bicycle retail for the bicycle growth scenario, with job figures at the level of individual countries.

Bicycle industry

Our estimation of the turnover and employment impact for the bicycle industry follows from our estimate on number of bikes sold and average price per bike. In section 4.2.1, we computed that a doubling of bicycle modal share corresponds to a 42% increase in turnover for bike retail (bicycle sales, bicycle accessories sales and bike repair). We extrapolate this growth rate to the bicycle industry. As bike retail is clearly the main client of bicycle industry's products, we can assume that a 42% increase in retail turnover leads to a 42% increase in industry turnover. An underlying assumption is that the current trade patterns of bikes and bike components does not change, i.e. the share of bikes sold in the UK and produced in Germany, France, Holland, domestically, outside EU, etc. does not change.

We therefore assume a uniform increase of 42% in turnover for each country. This leads to a uniform increase of 42% in bike industry employment. The implications on FTE jobs is summarized in Table 15. We obtain an impact on employment in bicycle industry of 4526 FTE jobs.

There could be a reason for assuming that more European bikes will be sold with increasing modal shares. The reason is that with increasing modal shares, bike prices go up which could mean that cyclists buy less cheap Asian bikes and

FIGURE 3: CURRENT RELATIONSHIP BETWEEN BICYCLE MODAL SHARE AND AVERAGE PRICE PERBIKE (EXCL. VAT AND IN PPPUNITS) IN EU27 (BASED ON ECF ANALYSIS CREATEDFOR CYCLING INDUSTRY CLUB ADVOCACY SUMMIT 2012)

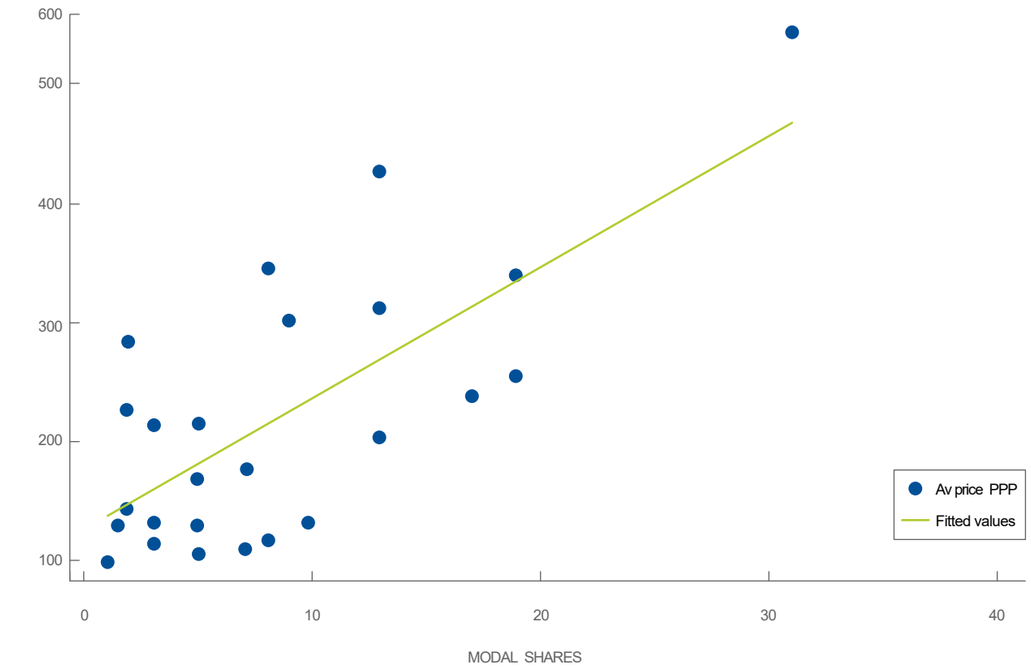


FIGURE 4: CURRENT RELATIONSHIP BETWEEN BICYCLE MODAL SHARE AND NUMBER OF BIKES SOLD PERCAPITA IN EU27

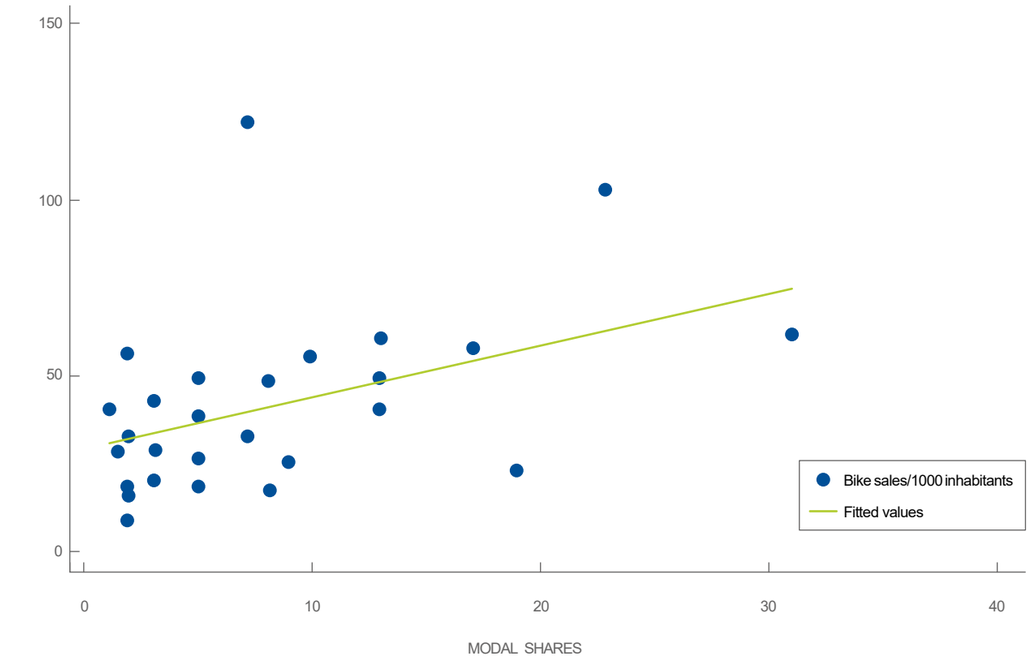


TABLE 13: CURRENT TURNOVER IN BICYCLE RETAILAND TURNOVER IN CASE OF DOUBLING OF MODAL SHARE

Scenario	Turnover bike sales (000 €)	Turnover accessories sales(000 €)	Turnover bike repair (000 €)	Total turnover (000 €)
EU27current	5 638 480	1 973 468	845 772	8 457 720
EU27growth	7 996 587	2 798 806	1 199 488	11994 881
% diff growth vs. current	41.82%	41.82%	41.82%	41.82%

TABLE 14: CURRENT FTEEMPLOYMENT IN BICYCLE RETAILAND JOBS IN CASE OF DOUBLING OF MODAL SHARE

Scenario	FTE Jobsbike sales	FTE Jobs accessories sales	FTE Jobsbike repair	Total FTEjobs
EU27current	50 696	17744	12147	80 587
EU27growth	76 677	26 837	18 682	122 196
% diff growth vs. current	51.25%	51.25%	53.8%	51.63%
Diff growth vs current	25 981	9093	6535	41609

more bikes at least assembledin Europe. Within the limits of the study, we were not able to investigate this element. We therefore remain with the linear relationship. This means probably that the employment effect in the manufacturing sector is underestimated.

In Annex VII (seehttp://tinyurl.com/cycling-jobs), we include more detailed employment estimates in bicycle industry for the bicycle growth scenario, with job figures at the level of individual countries.

Bicycle infrastructure

In estimating the effect of bicycle use on job creation through bicycle infrastructure, we again investigate the relationship using data for Europeancountries in the current situation. We have used previously the observation that the relationship between bike modal share and infrastructure investment per capita is nearly linear. It is therefore logical that we recover this linear pattern in the current data (Figure 5). We again use fitted values from this statistical model to obtain figures on investment per capita. We further multiply these with population per country to get an estimate of yearly total investment in bike infrastructure per country. We assumehere that Eastern European countries will catch up and attain comparablecycling infrastructure investment rates as Western European countries. We compute the employment impact by using the same FTE/investment ratio that we have used in chapter 3. We show the results in Table 16.

We find an effect of growth in bike use on bike infrastructure employment in EU27of around 57% in relative terms and 13348FTEjobs in absolute terms. This increase is related to the roughly linear relationship between bike modal share and bicycle infrastructure investment (as shown in Figure 5).

Bicycle tourism

For bicycle tourism, we make an indicative estimate of the potential increase in turnover based on reasoning and on numbers from the EuroVelo (2012)study.

Reasoning

In a scenario with doubling of modal share, this means that the people who consider the bicycle as their main transport mode would double. We interpret this doubling as an indication that the peoplewho use the bike for utility biking (mainly home– work travel) would double. It is currently unclear to which extent this increasein utility biking would carry over to additional bicycle leisure trips. It is reasonable to assumethat there is someeffect on bicycle tourism, in particular on day trips, but the correspondenceis probably lower than one on one. After all, in countries where functional cycling is not very common (Gallup, 2011),we observe that leisure cycling or cycling for tourist trips can still be quite popular (EuroVelo, 2012). The effect may be stronger if there would be separatepolicies that stimulate the tourism potential of regions and in particular the cycling tourism potential.

Estimation

Our estimate on the correspondence between bicycle modal share and expenses for cycle tourism is based on EuroVelo (2012). In this study, the authors estimate two separate demand models for cycling tourism, one for day trips and one for overnight trips. The demand model for day trips is partly based on a country's bicycle modal share. The demand model

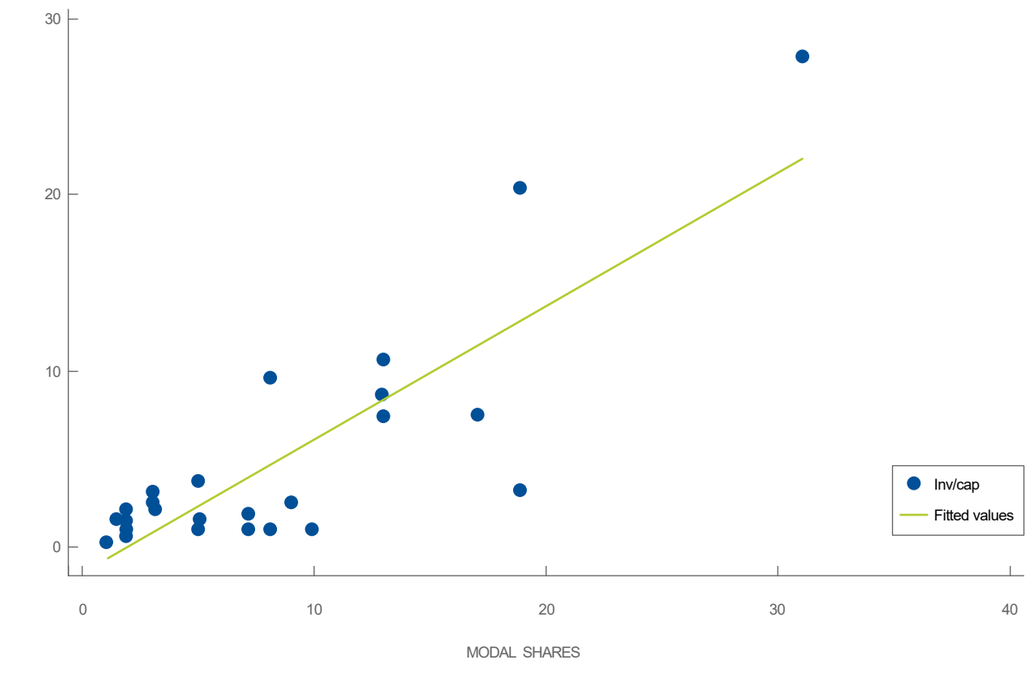
TABLE 15: OVERVIEW OF EMPLOYMENT EFFECT (FTE JOBS) OF GROWTH SCENARIO ON BICYCLE INDUSTRY

Scenario	Bicycle manufacturing	Parts and accessories manufacturing	Wholesale	Total industry FTE jobs
EU27 current	13 319	7207	2103	22 629
EU27 growth	18 913	10 234	2986	32 133
% diff growth vs. current	42%	42%	42%	42%
Diff growth vs current	5594	3027	883	9504

TABLE 16: ESTIMATE OF EMPLOYMENT IN BICYCLE INFRASTRUCTURE IN BICYCLE GROWTH SCENARIO AND COMPARISON WITH CURRENT SITUATION

EU Countries	Yearly investment (000 €)	FTE jobs/(1M €) investment	Jobs associated with cycling infrastructure
EU27 current	3 193 087	7.33	23 417
EU27 growth	5 013 000	7.33	36 484
%diff current vs growth	57%		57%
Diff current vs growth	1 819 913		13067

FIGURE 5: RELATIONSHIP BETWEEN MODAL SHARE AND YEARLY INVESTMENT PER CAPITA IN BICYCLE INFRASTRUCTURE



gives as an output an estimate of the yearly expenses on bicycle tourism in a country. We correct this absolute number by the population of a country to obtain a relative indicator of bicycle tourism intensity. This allows us to estimate a relationship between modal share (Gallup, 2011) and bicycle tourism turnover in a country.

We estimate a linear regression with the logarithm of modal share as explanatory variable and the logarithm of expenses on bicycle tourism/capita as the dependent variable. The relationship is estimated in logarithmic form to be able to interpret the results in terms of % changes. The result of this regression is shown in Figure 6.

Based on this regression, we estimate that a 100% increase in modal share corresponds to a 66% increase in bicycle tourism turnover. We would like to stress that this is an indicative estimate. It is entirely based on the numbers that can be found in the EuroVelo (2012) study, because of the lack of other information sources on bicycle tourism at the European level. The authors of the report caution that their results are indicative, so the conclusions that we base on these numbers should also be considered like that. If more data would be available on the link between functional cycling and leisure cycling, we could make a more reliable estimate. The estimate could further be improved by including more variables that can explain variation in bicycle tourism, such as: variation in weather patterns, availability of cycle tourism infrastructure, etc. This is however not possible with the available study resources.

Impact on employment

We can now calculate the employment effect using the same procedure as we have done for computing current bicycle employment (in chapter 3). This means that we start from turnover (growth) and subsequently calculate jobs using FTE job/turnover rates. Table 17 gives an overview of the estimated turnover and jobs in our bicycle growth scenario.

We estimate the resulting effect on employment creation to be around 345 865 FTE jobs for the EU27.

In Annex IX (see http://tinyurl.com/cycling-jobs), we provide more detailed employment estimates for bicycle tourism in the bicycle growth scenario, with job figures at the level of individual countries.

Bicycle services

For bicycle services, we have even less indications to estimate job growth in a scenario of a doubling in bicycle modal share than for bike tourism. It is not unreasonable to assume that FTE employment in bicycle services doubles when the amount of people for which the bike is the main transport mode doubles. The goal of the EU White Paper on Transport to reach "near zero-emission urban logistics" by 2030 shows there is political momentum to develop urban cycle logistics services. This means that a doubling in bicycle modal share would lead to an additional 4224 FTE jobs in bicycle services in comparison to the current situation, to a total of 8448 FTE jobs in bicycle services when bicycle modal share would double to a European average of 15.3%.

FIGURE 6: RELATIONSHIP BETWEEN MODAL SHARE AND YEARLY EXPENSES ON BICYCLE TOURISM PER CAPITA (BOTH VARIABLES HAVE BEEN LOGARITHMICALLY TRANSFORMED)

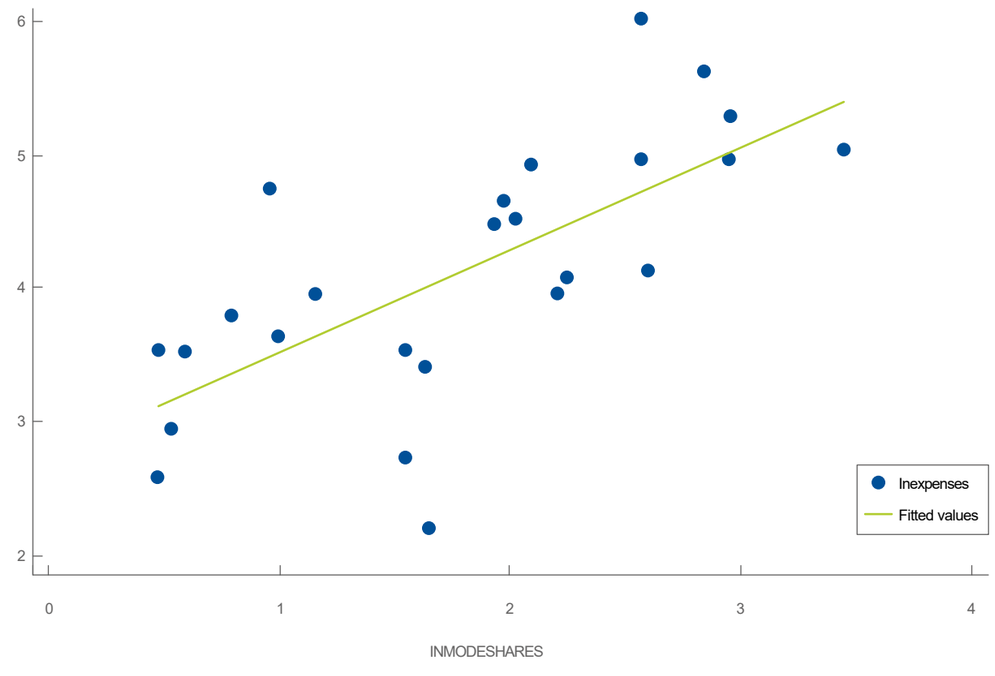


TABLE17: ESTIMATEOF EMPLOYMENT IMPACT ON BICYCLETOURISM FOLLOWING A DOUBLING IN BIKEMODAL SHARE

Scenario	Turnover over-night (000 €)	FTEovernight	Turnover day-trips (000€)	FTEdaytrips	Total FTEcycle tourism
EU27current	8 650 000	105 221	33 810 000	418 842	524 063
EU27growth	14 359 000	174 650	56 124 600	695 278	869 927
%diff current vs growth	66%	66%	66%	66%	66%
Diff current vs growth	5 709 000	69 429	22 314600	276 436	345 865

QUALITATIVE ASPECTSOF CYCLING EMPLOYMENT

This chapter contains a brief overview of qualitative elements in relation to cycling jobs. We discuss some elements that have not been the focus of our research so far.

1. JOB QUALITY

We provide some insights into average job quality of cycling-related employment. The information we provide is largely based on a study by Eurofound (2014) on 'working conditions and job quality: comparing sectors in Europe'. This study provides several job quality indicators for Europe, at the level of NACE sectors. We have seen earlier that this sector classification does not correspond entirely with the cycling sectors as we defined it. The NACE sectors are too broad and encompass other activities besides cycling. On the other hand, cycling related employment is scattered over several NACE codes.

For this qualitative analysis, we select a number of NACE codes which contain the most important groups of cycling jobs. Table 18 provides an overview of NACE sector, the economic activity related to cycling and the sector definition as used in the Eurofound (2014) report.

Some selected insights from the Eurofound job quality study:

- Average size of the workplace
  - Many small workplaces (1-9 employees) in sectors Retail and Food & beverage
  - More mid-size workplaces (10-249 employees) in sectors Construction and Accommodation
  - Metal industry is the sector with largest workplaces: 250+ employees
- Gender distribution
  - Retail, accommodation and food & beverage services have slightly more female employees
  - Construction and metal industry are dominated by male employees
- Age distribution
  - Retail, food & beverage services and accommodation are sectors with relatively high share of young employees
  - Construction and metal industry have somewhat older working population, but are not the sectors with the oldest population either
- Self-employment
  - Share of self-employment around 20% in Retail and Construction sector
  - Share of around 17% in Food & beverage services
  - Lower shares of around 10% in Accommodation and 5% in metal industry
- Distribution of working hours & work-life balance
  - Construction and metal industry sector have longer hours worked on average (40+ per week), while hours worked is more around 38 hours in Retail, Accommodation and Food & beverage services
  - Variance in hours worked is highest in Food and beverages, somewhat lower in Retail, Accommodation and Construction and lowest in Metal industry
  - Retail, Accommodation and Food & beverages also work more atypical hours than the average sector
  - Work-life balance seems to be relatively worse in selected cycling sectors in comparison to the average
    - Accommodation and food & beverage score much worse on work-life than other sectors.
- Training
  - The % of workers having received employer-paid training is also lower in selected cycling sectors than in the average economic sector
    - Level is lowest for accommodation, retail and food & beverages
- Earnings
  - Selected cycling sectors are not the highest paying economic sectors
    - Food & beverages, retail and accommodation are below the average economic sector in terms of wages
    - Metal industry and construction are above the average, but not among the highest wage sectors (financial services, banking, insurance)
- Working time quality
  - Selected cycling sectors are below the average in terms of working time quality
    - Construction is close to the average, whereas food & beverages is among the lowest.
- Safety
  - Retail, accommodation and food & beverage services are very safe occupations
  - Metal industry and construction are among the more dangerous work environments
- Willing to do job at 60 years
  - Most selected cycling sectors are below the average in terms of willingness to do the job at 60 years
  - Professions with higher willingness to work beyond 60 years: financial services, computer programming, legal and accounting services, etc.

TABLE18: SELECTION OF NACE SECTOR, CYCLING ECONOMIC ACTIVITY AND RELATEDEUROFOUND SECTOR

NACE sector	Cycling economic activity	Eurofound sector definition
3092 Manufacture of bicycles and invalid carriages	Manufacture of bicycles	Metal industry
4211Construction of roads and motorways	Bicycle infrastructure	Construction
4764 Retail sale of sporting equipment in specialized stores	Pedal cycles retail, cycles accessories dealer retail	Retail
55 Accommodation	Overnight cycle tourism	Accommodation
56 Food and beverage	Cycle tourism	Food and beverage service activities

Conclusion

The analysis is approximate as the relation between NACE codes and cycle sectors is not always exact. We can still conclude that job quality in the cycling sector is only slightly lower than the average European job, in spite of the NACE sectors in which cycling employment can be found. Industrial jobs typically offer a lower job quality than many services jobs (such as financial services, public services, etc.). Also, a high share of cycling employment is in the tourist industry, which mainly consists of food & beverage and accommodation as employment sectors. These are also below average in terms of job quality according to the Eurofound report.

On the other hand, this observation also creates opportunities: the cycling sectors provide chances for people with relatively low qualification levels, for whom finding employment can be a real challenge in the current job market situation. Cycling thus helps achieve the EU target for inclusive growth – 75% employment rate for women and men aged 20-64 by 2020 – by getting more people into work, especially those lacking higher qualifications.

2. JOB INTENSITY

Job intensity is an important indicator, because it gives an idea about the number of jobs that can be sustained with a given revenue stream in various economic sectors. This number thus indicates the job intensity of a certain turnover realization. We analyse average European job intensity in various economic sectors.

In Table 19, we compare job intensity in the cycling economy with employment intensity in related sectors for motor vehicles. The data we use are from Eurostat Structural Business Statistics. We make sure that we conduct a representative comparison by using a balanced sample of European countries. This means that we take the weighted average of FTEs/turnover, only including the countries where data is available for bike sector and for the other transport sector. If not, we could bias the comparison between both groups.

The table shows that for a similar increase in turnover, job creation in cycling industry is above that for other transport modes. This observation holds for manufacturing activity and for retail sale of bicycles and accessories/equipment. It is also true for investment in infrastructure. The employment effect of cycling infrastructure is 1.28 times higher than the employment effect of general transport infrastructure. The only activity for which the situation is different is repair: job creation per turnover is higher in motor vehicle repair than in bike repair.

The adjustment factor we mention in the table refers to the fact that we have increased the jobs/turnover rate based on the numbers from the French ATOUT study (Mercat, 2009). Without the adjustment factor we use the FTE/turnover rate from Eurostat Structural business statistics for sector NACE4764 "Retail sale of sporting equipment in specialized stores". With the adjustment factor, we use the FTE/turnover rate from the French ATOUT study. In any case, both job intensity indicators are higher for the sale of bicycles than for motor vehicles.

3. GROSS EMPLOYMENT EFFECTSVS. NET EMPLOYMENT EFFECTS

We calculated the number of jobs in the cycle sector or the increase in jobs in the cycle sector. This is the gross employment effect of the cycle sector. We would like to stress that we did not calculate what are the net employment effects (a pure increase in jobs) and what are the effects that will probably be compensated by a decrease in jobs in other sectors (eg. an increase in cycling could lead to a decrease in the use of cars which could lead to a loss of jobs in the car sector).

To analyse this, we should ask the question what the situation would be with cyclists and without cyclists. It is clear that without cyclists and cycles, a part of these jobs would have disappeared (the net effect). It is also clear however

TABLE 19: JOB INTENSITY COMPARISON BETWEEN BICYCLE SUBSECTORS AND RELATED SECTORS (IN FTE EMPLOYMENT/1M € TURNOVER, AVERAGE FOR EU)

	Bicycle	Other transport
Manufacturing	4.89	Car: 1.63 Ships and boats: 4.07 Air and spacecraft: 3.9
Sales + accessories sale	5.42 (without adjustment) 8.13 (with adjustment)	Motor vehicles: 1.92
Repair	5.23	Motor vehicles: 7.59
Infrastructure	Cycle-specific: 7.33	General: 5.73

that other jobs would be created in the production of other transport modes (the compensating effect). The net employment effect of cycling is the difference in the number of jobs in a situation with cyclists and a situation without cyclists. With the limited resources in this project, we were not able to calculate the net effects. We provide however some qualitative comments.

The main employment effects are in the tourism sector. Lots of cycling jobs are linked to the tourist sector. We can, however, assume that the elasticity between "cycle tourism" and "normal tourism" is very high. In other words, if a cyclist does not take a cycle holiday or excursion, he will take another holiday or excursion, most probably not in the same area. We could therefore assume that the net increase in jobs in the tourism sector is only small compared to the gross effect we calculated. At the same time, jobs and revenues in the tourism sector could be redistributed to some extent. Countries with good cycle tourist infrastructure can attract more tourists, while countries with less good cycle tourist infrastructure could lose tourists.

We also expect that an increase in cycling jobs leads to a small reduction in jobs in the car industry and retail sectors. More cycling means (a bit) less cars. Based on our own studies and the Copenhagen bicycle accounts, the share of cyclists suppressing a car is around 10% to 20%. Further research is needed to see if this means suppressing car ownership or car use – if only the latter is concerned, jobs in the car industry will largely be unaffected. On the other hand, we have also seen that job intensity is higher in the cycling industry sector than in the car industry. For this reason, we do expect that an increase in bicycle modal share will in the end lead to a net job growth effect. In addition to this, we can also notice that many studies have found that cyclists contribute more to the local economy than car drivers. This can also be considered as a positive element of cycling jobs, as it is more difficult to replace local jobs with jobs outside of Europe.

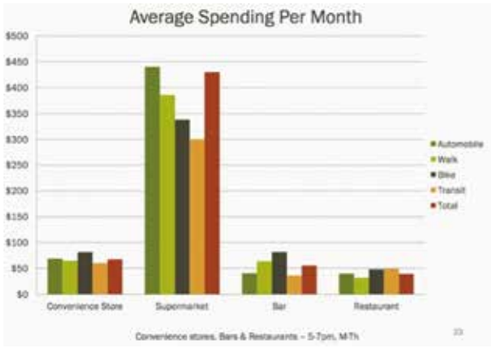
4. CYCLING AND THE LOCAL ECONOMY

Lots of studies show that cyclists spend in the local economy compared to users of others transport modes. We provide a small sample of those studies and their main conclusions.

- A survey of Fubicy for ADEME, the environmental agency found that:
  - Non-motorized clients are more loyal than motorized clients.
  - Non-motorized clients spend less per shop visit, but they visit shops more frequently
  - The shops in the city centers create less automobile traffic than shopping centers at the periphery. (Fubicy, publication 4841)
- Studies in Utrecht (the Netherlands), Münster (Germany) and Amsterdam (the Netherlands) see that cyclists spend less per visit, but visit shops more frequently.
- In Copenhagen, cyclists contribute the most to the turnover of the retail sector. (Marie Kästrup, 2013)
- A study of the Portland State University (Kelly Cliftron) came to similar conclusions for Portland. Cyclists spend more in the local convenience stores, bars, cafés and restaurants. The figure below illustrates the conclusions.

Most of the time, the studies of the type of the above ones, do not correct for other social factors like income, social status or household situation. These studies give a first indication, more in-depth studies would be very welcome to confirm the results.

FIGURE 7: AVERAGE EXPENSES PER MONTH IN THE RETAIL SECTOR DEPENDING ON THE MEANS OF TRANSPORT (CLIFTON, 2012)



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Mission Statement

Founded in 1983, the **European Cyclists' Federation** (ECF) is the umbrella federation of the national cyclists' associations in Europe, reinforced by similar organisations from other parts of the world. On behalf of our members, we are pledged to ensure that bicycle use achieves its fullest potential so as to bring about sustainable mobility and public well-being. To achieve these aims, the ECF seeks to change attitudes, policies and budget allocations at the European level. ECF stimulates and organises the exchange of information and expertise on bicycle related transport policies and strategies as well as the work of the cyclists' movement.

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