Table S1. BNs variables and hierarchical model (level 1, 2 and 3) of fairness characteristics analyzed for use case 1 railway stations. Weights (w) are included between parenthesis, normalized weights for level 1 and 2 FC, and global normalized weights for level 3. Note: Those FCs with a weight of 0 is due to a lack of data or because the data gathered had the same value and did not allow performing the BN analysis.

FC Level 1	FC Level 2	FC Level 3	Code	BNs variables	Data source
1. ACCESSIBILITY OF THE SERVICE (*w* = 0.39462)	*1.1. SERVICE AVAILABILITY AND EFFICIENCY (w = 0.46248)*	Walking time from the points of interest to the public transport access points (w = 0.02033)	FC111	I can easily get to my destination from the station by walking or using other means of transport.	UESI questionnaire
		Reliability of the service modes available (w = 0.02808)	FC112b	Average no. of minutes per month of service delay of the lines working on each station.	Dataset (Proprietary data)
			FC112a	Public transport fulfills my daily travel requirements in terms of time, price, security	UESI questionnaire
		Operational hours and frequency of the service (w = 0.02503)	FC113b	Operational hours per station	Dataset (Proprietary data)
			FC113c	Frequency of train arrival/departure.	Dataset (Proprietary data)
			FC113a	Operational hours (starting and ending hours) are sufficient to meet my travel needs	UESI questionnaire

Level of service at the public transport access point (w = 0.02162)	FC114	The frequency (number of trains) and service efficiency (being on time) at this station is adequate for my needs	UESI questionnaire
Number of service available within the transport infrastructure (w = 0.02778)	FC115a	The facility and service availability within the station is appropriate (seating area, bar, pharmacy, ATMs…)	UESI questionnaire
	FC115b	Yes/No about services available within the station infrastructure	Observations
Integration with other modes of public transport including bus, train, etc. (w = 0.01320)	FC116	Public transport fulfills my daily travel requirements in terms of work commute and other trips	UESI questionnaire
Integration with alternative shared mobility service for last mile connections, including bike, scooter and car sharing (w = 0.03152)	FC117	Yes/No about alternative shared mobility services for last mile connections within 400 m	Observations
Availability of on-demand transport services including taxi and paratransit (w = 0.03217)	FC118	Yes/No about on-demand transport service including taxi and paratransit within 400 m	Observations

1.2. TRAVEL AND WAYFINDING INFORMATION PROVISION (w = 0.17882)	Clear, concise, accurate and timely ongoing travel updates through video and audible announcements in multiple languages including service changes, delays, adverse events, station identification, etc. (w = 0.01143)	FC121a	I am pleased with the provided travel information at the railway station	UESI questionnaire
		FC121b	Yes/No about travel updates through video announcements clear and timely considering the concourse level.	Observations
		FC121n	Yes/No about travel updates through video announcements clear and timely considering the platform level.	Observations
		FC121d	Yes/No about travel updates through video announcements clear and timely considering the carriage.	Observations
		FC121e	Yes/No about travel updates through video announcements in multiple languages considering the concourse level.	Observations
		FC121f	Yes/No about travel updates through video announcements in multiple languages considering the platform level.	Observations
		FC121g	Yes/No about travel updates through video announcements in multiple languages considering the carriage.	Observations

FC121h	Yes/No about travel updates through audible announcements clear and timely considering the concourse level.	Observations
FC121i	Yes/No about travel updates through audible announcements clear and timely considering the platform level.	Observations
FC121j	Yes/No about travel updates through audible announcements clear and timely considering the carriage.	Observations
FC121k	Yes/No about travel updates through and audible announcements in multiple languages considering the concourse level.	Observations
FC121l	Yes/No about travel updates through and audible announcements in multiple languages considering the platform level.	Observations
FC121m	Yes/No about travel updates through and audible announcements in multiple languages considering the carriage.	Observations

User friendly, intuitive and easily understandable time table and network maps (w = 0.01029)	FC122a	The availability of travel information and directions (e.g. maps, announcements and video messages in and around stations,) at this station meet my travel needs	UESI questionnaire
	FC122b	Yes/No about travel information provision through time table and network map considering the concourse level.	Observations
	FC122c	Yes/No about travel information provision through time table and network map considering the platform level.	Observations
	FC122d	Yes/No about travel information provision through time table and network map considering the carriage.	Observations
Information point, enquiry desks, help desks, security desks (for reporting and abuse, a lost item or a suspicious person) (w = 0.01202)	FC123	Yes/No about info points, enquiry desks, help desks and security desks	Observations
Vertical and horizontal signposting for easy wayfinding (w = 0.01072)	FC124a	I am satisfied that all services, exits, and platforms are clearly signposted	UESI questionnaire

	FC124b	Yes/No about vertical and horizontal signposting for easy wayfinding, considering the concourse level.	Observations
	FC124c	Yes/No about vertical and horizontal signposting for easy wayfinding, considering the platform level.	Observations
Comprehensive and flexible mobile app and online planning tool and route finder, considering aspects such as real time traffic information, proximity of stops to main attractions and landmarks of the city, weather conditions, travel time, fare options, mode selection, universal access aspects of the stations, etc. (w = 0.00498)	FC125	I am satisfied with travel ticketing, timetabling and route planning services available on a smartphone app or online	UESI questionnaire
Information regarding positive environmental contribution (w = 0.01223)	FC126	Yes/No about information provision regarding positive environmental contribution, considering both the concourse level and the platform level.	Observations

1.3. TICKETING OPTIONS AND FARES (w = 0.23212)	Affordability of the service in general in comparison to use of privately-owned vehicles (w = 0.00856)	FC131	Fare discounts and ticket options are more affordable and better value for money than traveling by private car	UESI questionnaire
	Discounted fares (w = 0.01330)	FC132	Structured data regarding discounted fare options.	Dataset (Proprietary data)
	Flexible fare options for multiple and intermodal trips, group trips, family trips, transferable tickets (w = 0.01503)	FC133a	Structured data regarding flexible fare options for multiple and intermodal trips	Dataset (Proprietary data)
		FC133b	Structured data regarding flexible fare options for group trips	Dataset (Proprietary data)
		FC133c	Structured data regarding flexible fare options for family trips	Dataset (Proprietary data)
		FC133d	Structured data regarding flexible fare options for transferable tickets.	Dataset (Proprietary data)
	Pay-per-use options (w = 0.01546)	FC134	Structured data regarding pay-per-use options.	Dataset (Proprietary data)
	Subscription or monthly payment options (w = 0.01475)	FC135	Structured data regarding subscription or monthly payment options.	Dataset (Proprietary data)

	Electronic ticket and flexible payment methods using cash, credit card, smartphones and mobile apps (w = 0.01541)	FC136b	Number of electronic ticket and flexible payment methods: cash, credit card, smartphones and mobile apps.	Dataset (Proprietary data)
		FC136a	Yes/No about electronic ticket and flexible payment methods using cash, credit card, smartphones and mobile apps.	Observations
	Availability of ATMs, ticket machines, ticket office and alternative sale points inside and outside of stations (w = 0.01498)	FC137b	Number of ATMs	Dataset (Proprietary data)
		FC137c	Number of ticket machines	Dataset (Proprietary data)
		FC137d	Number of ticket office	Dataset (Proprietary data)
		FC137e	Number of alternative sale points inside of the station	Dataset (Proprietary data)
		FC137f	Number of alternative sale points outside of the station	Dataset (Proprietary data)
		FC137a	Yes/No about availability of ATMs, ticket machines, ticket office and alternative sale points inside and outside of stations.	Observations
1.4. TRAVEL PURPOSE (w = 0.12658)	Travel purpose (e.g. work, shopping, personal business, leisure, education, etc.) (w = 0.00430)	FC141	I can easily travel to my work place using public transport, if this applies to you	UESI questionnaire

	Travel destination (e.g. urban, sub-urban) (w = 0.00341)	FC142	It is easy to get to where I want to go using this public transport service	UESI questionnaire
2. INFRASTRUCTURE DESIGN (*w* = 0.21512) / *2.1. UNIVERSAL DESIGN (w = 0.41713)*	Lift with enough room to carry shopping bags, baby strollers, luggage and wheelchair to access the station and transfer within the stations (w = 0.01398)	FC211a	Access within and around the station suit the needs of people with varying abilities (stairs, lifts, rail etc.)	UESI questionnaire
		FC211b	Yes/No about lift with enough room to carry shopping bags, baby strollers, luggage and wheelchair to access the station and transfer within the stations at concourse level.	Observations
		FC211c	Yes/No about lift with enough room to carry shopping bags, baby strollers, luggage and wheelchair to access the station and transfer within the stations at platform level.	Observations
	Ramps and escalator with enough room to carry shopping bags, baby strollers, luggage and wheelchair to access the station and transfer within the stations (w = 0.01503)	FC212a	Yes/No about ramps and escalator with enough room to carry shopping bags, baby strollers, luggage and wheelchair to access the station and transfer within the stations at concourse level.	Observations

	FC212b	Yes/No about ramps and escalator with enough room to carry shopping bags, baby strollers, luggage and wheelchair to access the station and transfer within the stations at platform level.	Observations
Bright color contrasting handrail to help people with visual impairment to identify support quickly (w = 0.01526)	FC213	Yes/No about bright color contrasting handrail to help people with visual impairment to identify support quickly.	Observations
Tactile surfaces to provide wayfinding information to people with reduced visual capabilities (w = 0.01497)	FC214a	Yes/No about tactile surfaces to provide wayfinding information to people with reduced visual capabilities at concourse level.	Observations
	FC214b	Yes/No about tactile surfaces to provide wayfinding information to people with reduced visual capabilities at platform level.	Observations
Signposting with bright color contrasting and large font to help people with visual impairment (w = 0.01543)	FC215a	Yes/No about signposting with bright color contrasting and large font to help people with visual impairment at concourse level.	Observations

	FC215b	Yes/No about signposting with bright color contrasting and large font to help people with visual impairment at platform level.	Observations
Safe and easily accessible drop-off and pick-up points (w = 0.01527)	FC216	Yes/No about safe and easily accessible drop-off and pick-up points.	Observations
Safe and step free pedestrian crossings and sidewalks surrounding the stations (w = 0.01556)	FC217	Yes/No about safe and step free pedestrian crossings and sidewalks surrounding the stations.	Observations
Positioning ticket machines and wayfinding information at convenient height for a wide variety of users (w = 0.01535)	FC218a	Yes/No about positioning ticket machines at convenient height for a wide variety of users.	Observations
	FC218b	Yes/No about positioning wayfinding information at convenient height for a wide variety of users at concourse level.	Observations
	FC218c	Yes/No about positioning wayfinding information at convenient height for a wide variety of users at platform level.	Observations

Fare gates to accommodate a wide variety of users (w = 0.01567)	FC219	Yes/No about fare gates to accommodate a wide variety of users.	Observations
Appropriate height steps or step-free access to trains (w = 0.01280)	FC2110	Yes/No about appropriate height steps or step-free access to trains.	Observations
Handles suited at convenient height for all users including women, children and disabled people or vertical grab bars (w = 0.01436)	FC2111	Yes/No about handles suited at convenient height for all users including women, children and disabled people or vertical grab bars.	Observations
Adequate lighting in the stations and the surrounding area of stations (w = 0.01482)	FC2112a	There is adequate lighting in the station and the area around the station.	UESI questionnaire
	FC2112b	Level of adequate lighting (1-4) in the stations and the surrounding area of stations (AM, natural lighting) at surrounding area.	Observations

FC2112c	Level of adequate lighting (1-4) in the stations and the surrounding area of stations (AM, natural lighting) at concourse level.	Observations
FC2112d	Level of adequate lighting (1-4) in the stations and the surrounding area of stations (AM, natural lighting) at platform level.	Observations
FC2112e	Level of adequate lighting (1-4) in the stations and the surrounding area of stations (PM, artificial lighting)at surrounding area.	Observations
FC2112f	Level of adequate lighting (1-4) in the stations and the surrounding area of stations (PM, artificial lighting)at concourse level.	Observations

		FC2112g	Level of adequate lighting (1-4) in the stations and the surrounding area of stations (PM, artificial lighting) at platform level.	Observations
2.2. CLEANLINESS AND MAINTENANCE (w = 0.31784)	Clean and hygienic environment especially for handholds and toilets (w = 0.01065)	FC221a	The cleanliness and maintenance of the environment (station and the train) are adequate.	UESI questionnaire
		FC221b	Yes/No about clean and hygienic environment especially for handholds and toilets at the concourse level.	Observations
		FC221c	Yes/No about clean and hygienic environment especially for handholds and toilets at the platform level.	Observations
		FC221d	Yes/No about clean and hygienic environment especially for handholds and toilets at the carriage.	Observations

	Waste recycling baskets (w = 0.01133)	FC222a	Yes/No about waste baskets at the concourse level.	Observations
		FC222b	Yes/No about waste baskets at the platform level.	Observations
		FC222c	Yes/No about waste recycling baskets at the concourse level.	Observations
		FC222d	Yes/No about waste recycling baskets at the platform level.	Observations
	Maintenance of deterioration, graffiti and vandalism (w = 0.01166)	FC223a	Yes/No about maintenance of deterioration, graffiti and vandalism at the concourse level.	Observations
		FC223b	Yes/No about maintenance of deterioration, graffiti and vandalism at the platform level.	Observations
		FC223c	Yes/No about maintenance of deterioration, graffiti and vandalism at the carriage.	Observations
	Separated toilets for women (w = 0.00950)	FC231	Yes/No about separated toilets for women.	Observations

Allocated seats to pregnant women, parents with young children and elderly (w = 0.00792)	FC232a	Facilities such as seating, backrests and restrooms are adequate and convenient for all genders and abilities	UESI questionnaire
	FC232b	Yes/No about allocated seats to pregnant women, parents with young children and elderly.	Observations
Waiting areas with seating arrangements (w = 0.00965)	FC233a	Yes/No about waiting areas with seating arrangements at the concourse level.	Observations
	FC233b	Yes/No about waiting areas with seating arrangements at the platform level.	Observations
Baby changing facilities in both men and women toilets (w = 0.00969)	FC234	Yes/No about baby changing facilities in both men and women toilets.	Observations
Breastfeeding facilities (w = 0.00831)	FC235a	There are quiet or private facilities available to parents for infant feeding if they wish to avail of them.	UESI questionnaire
	FC235b	Yes/No about breastfeeding facilities.	Observations
Vending machines (w = 0.00987)	FC236a	Yes/No about vending machines at the concourse level.	Observations
	FC236b	Yes/No about vending machines at the platform level.	Observations

Left luggage and lost property offices (w = 0.00944)	FC237	Yes/No about left luggage and lost property offices.	Observations
Wi-Fi or 3G/4G connection (w = 0.00967)	FC238a	Yes/No about Wi-Fi or 3G/4G connection at the concourse level.	Observations
	FC238b	Yes/No about Wi-Fi or 3G/4G connection at the platform level.	Observations
	FC238c	Yes/No about Wi-Fi or 3G/4G connection at the carriage.	Observations
Car and moto public parking places (w = 0.00910)	FC239a	At all times of the day, there are safe and easily accessible parking, drop-off and pick-up points nearby for all private vehicles.	UESI questionnaire
	FC239b	Yes/No about car and moto public parking places.	Observations
Bicycles storage facilities and bicycles racks (w = 0.00976)	FC2310	Yes/No about bicycles storage facilities and bicycles racks.	Observations
Weather protected pedestrian routes between transit modes where applicable (w = 0.00947)	FC2311	Yes/No about weather protected pedestrian routes between transit modes where applicable.	Observations
Sheltered waiting areas for buses, taxis, etc. (w = 0.00973)	FC2312	Yes/No about sheltered waiting areas for buses, taxis, etc.	Observations

3. SAFETY AND SECURITY (*w* = 0.39026)	*3.1. HARASSMENT AND PICKPOCKETING (w = 0.44263)*	Number and typology of incidents (w = 0.02943)	FC311	No. of sexual/physical harassment incidents, assault incidents and pickpocketing episodes per station	Dataset (Proprietary data)
		Presence and visibility of CCTV system (w = 0.02641)	FC312e	No. of CCTV systems.	Dataset (Proprietary data)
			FC312a	There are enough CCTV systems and other security measures visible to make me feel safe.	UESI questionnaire
			FC312b	Yes/No about presence and visibility of CCTV system at the concourse level.	Observations
			FC312c	Yes/No about presence and visibility of CCTV system at the platform level.	Observations
			FC312d	Yes/No about presence and visibility of CCTV system at the carriage.	Observations
		SOS emergency pone (w = 0.02621)	FC313e	No. of SOS emergency phones.	Dataset (Proprietary data)
			FC313a	I am confident that I would be able to evacuate the station/train in an emergency situation (with help if necessary).	UESI questionnaire

	FC313b	Yes/No about presence and visibility of SOS emergency phones at the concourse level.	Observations
	FC313c	Yes/No about presence and visibility of SOS emergency phones at the platform level.	Observations
	FC313d	Yes/No about presence and visibility of SOS emergency phones at the carriage.	Observations
Presence of police and security personnel including women police to be a deterrent for perpetrators (w = 0.02639)	FC314f	No. of security personnel	Dataset (Proprietary data)
	FC314a	Within the station I feel that my belongings and I are safe at any time of the day.	UESI questionnaire
	FC314b	Yes/No about presence of police and security personnel at the surrounding area (400 m)	Observations
	FC314c	Yes/No about presence of police and security personnel at the concourse level	Observations
	FC314d	Yes/No about presence of police and security personnel at the platform level	Observations
	FC314e	Yes/No about presence of police and security personnel at the carriage	Observations

Visibility of the surrounding area of the station (w = 0.02464)	FC315a	When arriving at or leaving the station I feel safe at any time of the day.	UESI questionnaire
	FC315b	Level of visibility (1-4) of the surrounding area of the station (400 m) (AM, natural lighting).	Observations
	FC315c	Level of visibility (1-4) of the surrounding area of the station (400 m) (PM, artificial lighting).	Observations
Complaint information point in case of violations to personal safety (w = 0.02540)	FC316a	If needed, I am satisfied that I could get help or make a complaint straight away (e.g. security staff, emergency phone number).	UESI questionnaire
	FC316b	Yes/No about complaint information point in case of violations to personal safety.	Observations
Availability of hospitality rooms where to ask for help in case of aggression or need (w = 0.02948)	FC317	Yes/No about availability of hospitality rooms where to ask for help in case of aggression or need.	Observations
Display advertisements for public awareness campaigns and for publicizing helpline numbers (w = 0.02913)	FC318	Yes/No about display advertisements for public awareness campaigns and for publicizing helpline numbers.	Observations

3.2. OVERCROWDING AND EMERGENCY SITUATIONS (w = 0.55736)	Offering adequate personal space (w = 0.02904)	FC321	I feel comfortable with the personal space available to me at stations and in carriages.	UESI questionnaire
	Improved ventilation and air-conditioning (w = 0.02752)	FC322a	I feel comfortable with the air-conditioning (temperature, ventilation, humidity) at stations and in carriages.	UESI questionnaire
		FC322b	Yes/No about ventilation and air-conditioning.	Observations
	Improved layout of seating (longitudinal seating included less social interaction compared to transverse seating) (w = 0.03544)	FC323	Yes/No about layout of seating	Observations
	Level of public transport during the COVID-19 pandemic (w = 0)	FC324	Level of satisfaction with the level of public transport (1-7)	UESI questionnaire
	Safety protocols to prevent/inhabit cross contamination during the COVID 19 pandemic among public transport users (w = 0)	FC325	Level of effectiveness of the current safety protocols to prevent/inhabit cross contamination during the COVID 19 pandemic among public transport users (1-7)	UESI questionnaire

Laws regarding wearing mask and the use hand sanitizer on public transport for all user (w = 0)	FC326	Level of importance of the laws that require wearing mask and the use hand sanitizer on public transport for all user (1-7)	UESI questionnaire
Public transport service performance during the COVID-19 pandemic (w = 0)	FC327	Level of perception of the public transport service performance during the pandemic (1-7)	UESI questionnaire
Exposition of bus drivers, train drivers and their current work situation to the COVID-19 infection considering the preventative measures taken (w = 0)	FC328	Level of exposition do you consider bus drivers, train drivers and their current work situation are to covid-19 infection considering the preventative measures that are being taken (1-7)	UESI questionnaire
Perception of the personal exposition while using the public transport (1-7) (w = 0)	FC329	Level of exposition you consider yourself to be to the risk of covid-19 infection while using the public transport (1-7)	UESI questionnaire

Table S2. BNs variables and hierarchical model (level 1, 2 and 3) of fairness characteristics analyzed for use case 2 autonomous vehicles. Weights (w) are included between parenthesis, normalized weights for level 1 and 2 FC, and global normalized weights for level 3. Note: Those FCs with a weight of 0 is due to a lack of data or because the data gathered had the same value and did not allow performing the BN analysis.

FC Level 1	FC Level 2	FC level 3	Code	BNs variables	Data source
1. SAFETY AND SECURITY (*w* = 0.32646)	*1.1. ACCIDENT RATE (w = 0.22143)*	Perception of reduction of accidents thanks to Avs (w = 0.02697)	FC111	AVs will reduce accident rate	UESI questionnaire
		Perception of safety in any conditions (w = 0.02584)	FC112	AVs are safer than conventional cars under any condition.	UESI questionnaire
	1.2. HUMAN ERRORS (w = 0.32260)	Perception of increased safety of Avs (w = 0.03787)	FC121	AVs are safer than conventional cars	UESI questionnaire
		Perception of reduced safety of AVs (w = 0.03439)	FC122	I feel AVs are unsafe in comparison to conventional cars	UESI questionnaire
		Perception of reduced impact of human errors (w = 0)	FC123	Overall, AVs would help make journeys safer, reducing the impact of human errors of present cars.	UESI questionnaire

	1.3. TRAINING (w = 0.23421)	Perception of easier training needs (w = 0.02240)	FC131	Training in AV driving will be easier than for conventional cars.	UESI questionnaire
	1.4. TRAFFIC MANAGEMENT (w = 0.22175)	Perception of comfort sharing data to others (w = 0.02697)	FC141	I would be comfortable allowing my vehicle to transmit and share data to organizations that manage/maintain the roadway.	UESI questionnaire
		Perception of improved traffic management with Avs (w = 0.02352)	FC142	AVs will increase traffic efficiency and management	UESI questionnaire
2. COMFORT (w = 0.09253)	*2.1. TRUST IN TECHNOLOGY (w = 0.45197)*	Perception of trust industry minimizing risks for humans (w = 0.01409)	FC211	I trust the automotive industry to minimize potential risks of AVs to humans	UESI questionnaire
		Perception of doubts in technologies (w = 0.01543)	FC212	I am suspicious of new technologies, I have serious doubts of their long-term reliability and performance	UESI questionnaire

Perception of dislike delegating decisions (w = 0.01547)	FC213	I prefer to take my decisions. I don't like a machine taking decisions for me	UESI questionnaire
Perception of overall trust (w = 0.01062)	FC214	I believe that I can depend and rely on AVs for my displacements	UESI questionnaire
Perception of trust good weather (w = 0)	FC215	I am comfortable to travel by AV under favorable meteorological conditions	UESI questionnaire
Perception of trust bad weather (w = 0)	FC216	I am comfortable to travel by AV under unfavorable meteorological conditions	UESI questionnaire
Perception of trust failure (w = 0)	FC217	I trust that AVs will provide adequate, effective, and responsive help under failure/error circumstances	UESI questionnaire
Good weather (w = 0.01172)	FC218a	Valence value during AV driving in favorable weather conditions (Fisio)	Observations
	FC218b	Valence value during AV driving in favorable weather conditions (SAM)	Observations

	FC218c	Arousal value during AV driving in favorable weather conditions (Fisio)	Observations
	FC218d	Arousal value during AV driving in favorable weather conditions (SAM)	Observations
Bad weather (w = 0.01301)	FC219a	Valence value during AV driving in unfavorable weather conditions (Fisio)	Observations
	FC219b	Valence value during AV driving in unfavorable weather conditions (SAM)	Observations
	FC219c	Arousal value during AV driving in unfavorable weather conditions (Fisio)	Observations
	FC219d	Arousal value during AV driving in unfavorable weather conditions (SAM)	Observations
Failure indication (w = 0.01192)	FC2110a	Valence value when the AV car indicates a failure and must to stop (Fisio)	Observations
	FC2110b	Valence value when the AV car indicates a failure and must to stop (SAM)	Observations
	FC2110c	Arousal value when the AV car indicates a failure and must to stop (Fisio)	Observations
	FC2110d	Arousal value when the AV car indicates a failure and must to stop (SAM)	Observations

		Failure not solved (w = 0.01183)	FC2111a	Valence value during the period the AV car is solving the failure (Fisio)	Observations
			FC2111b	Valence value during the period the AV car is solving the failure (SAM)	Observations
			FC2111c	Arousal value during the period the AV car is solving the failure (Fisio)	Observations
			FC2111d	Arousal value during the period the AV car is solving the failure (SAM)	Observations
		Event affecting personal safety (w = 0.01231)	FC2112a	Valence value an event affects personal safety perception (Fisio)	Observations
			FC2112b	Valence value an event affects personal safety perception (SAM)	Observations
			FC2112c	Arousal value an event affects personal safety perception (Fisio)	Observations
			FC2112d	Arousal value an event affects personal safety perception (SAM)	Observations
	2.2. SIMULTANEITY (w = 0.54802)	Perception of overall value of simultaneity (w = 0.01341)	FC221	I value doing other tasks in my displacements in AV	UESI questionnaire
		Perception of the degree of simultaneity (w = 0.01929)	FC222	AVs allow performing different tasks while travelling	UESI questionnaire

	Perception of the degree of interaction between passengers (w = 0.01543)	FC223	AVs allow a greater degree of interaction with other passengers	UESI questionnaire
	Driving when performing simultaneous tasks in comfortable external environment (w = 0.01357)	FC224a	Valence value during AV driving when performing simultaneous tasks in comfortable external environment (Fisio)	Observations
		FC224b	Valence value during AV driving when performing simultaneous tasks in comfortable external environment (SAM)	Observations
		FC224c	Arousal value during AV driving when performing simultaneous tasks in comfortable external environment (Fisio)	Observations
		FC224d	Arousal value during AV driving when performing simultaneous tasks in comfortable external environment (SAM)	Observations
	Driving when performing simultaneous tasks in enriched external environment (w = 0.01634)	FC225a	Valence value during AV driving when performing simultaneous tasks in enriched external environment (Fisio)	Observations
		FC225b	Valence value during AV driving when performing simultaneous tasks in enriched external environment (SAM)	Observations

		FC225c	Arousal value during AV driving when performing simultaneous tasks in enriched external environment (Fisio)	Observations
		FC225d	Arousal value during AV driving when performing simultaneous tasks in enriched external environment (SAM)	Observations
	Efficiency of the task in comfort (w = 0)	FC226	Time to perform the simultaneous task in comfortable external environment.	Observations
	Efficiency of the task in enriched environment (w = 0)	FC227	Time to perform the simultaneous task in comfortable enriched environment.	Observations
	Perception of boredom (w = 0.01701)	FC228	Travelling with an AV will be more boring in comparison to conventional cars.	UESI questionnaire
	Perception of joy (w = 0.01631)	FC229	Travelling with an AV will be more pleasant in comparison to conventional cars.	UESI questionnaire

3. MOBILITY (*w* = 0.12991)	*3.1. TRAFFIC EFFICIENCY (w = 0.20144)*	Perception of improvement of traffic flow (w = 0.00918)	FC311	AVs will improve the traffic flow	UESI questionnaire
	3.2. *TRAVEL TIME (w = 0.27232)*	Destination on time (w = 0.00994)	FC321a	Valence value when reaching destination on time (Fisio)	Observations
			FC321b	Valence value when reaching destination on time (SAM)	Observations
			FC321c	Arousal value when reaching destination on time (Fisio)	Observations
			FC321d	Arousal value when reaching destination on time (SAM)	Observations
		Destination out of time (w = 0.01155)	FC322a	Valence value when reaching destination out of time (Fisio)	Observations
			FC322b	Valence value when reaching destination out of time (SAM)	Observations
			FC322c	Arousal value when reaching destination out of time (Fisio)	Observations
			FC322d	Arousal value when reaching destination out of time (SAM)	Observations

	Perception of AVs being faster (w = 0.01419)	FC323	AVs will be faster in displacements	UESI questionnaire
	Perception of liberation of parking responsibility (w = 0.01103)	FC324	AV allow me not paying attention to parking (looking for a parking place and maneuvering)	UESI questionnaire
3.3. CONGESTION (w = 0.27667)	AVs will facilitate traffic flow. (FC3 – Congestion) (w = 0.01211)	FC331	AVs will facilitate traffic flow	UESI questionnaire
3.4. ACCESSIBILITY (w = 0.24956)	Perception that AVs will improve mobility to people with disabilities and older adults (w = 0.01191)	FC341	I think AVs will facilitate the mobility of people who are not able to drive or to take a conventional car such as older people o people with disabilities	UESI questionnaire
	Preference on priorizing mobility for older persons and PRM (w = 0.01174)	FC342	AVs should prioritize the mobility of elderly people and people with moderate mobility problems	UESI questionnaire
	Preference on priorizing bulky transport (w = 0.01404)	FC343	AVs should prioritize transporting bulky loads (baggage, sports equipment, ….)	UESI questionnaire

		Preference on priorizing mobility for kid's needs (w = 0.01425)	FC344	AVs should prioritize kids' needs	UESI questionnaire
		Preference on priorizing mobility for pregnant women (w = 0.01047)	FC345	AVs should prioritize pregnant women needs	UESI questionnaire
		Preference on priorizing mobility for oversized people needs (w = 0.01202)	FC346	AVs should prioritize. oversized people need	UESI questionnaire
		Preference on priorizing mobility for people with disability (w = 0.01411)	FC347	AVs should prioritize the mobility of people with disability.	UESI questionnaire
		Preference on priorizing features for weekly household shopping (w = 0.01438)	FC348	AVs should prioritize the features making easier the weekly household shopping.	UESI questionnaire
4. ECONOMY (w = 0.16596)	*4.1. MONETARY COSTS (w = 0.25372)*	Perception of excessive cost (w = 0.01363)	FC411	AVs will be too expensive	UESI questionnaire
		Desire of buying the car, do not mind the cost (w = 0)	FC412	I would like to purchase an AV even though they might be expensive	UESI questionnaire

	4.2. NON-MONETARY COSTS (w = 0.44623)	-	-	-	-
	4.3. VEHICLE EFFICIENCY (w = 0.30004)	Perception that overall cost would be reduced (w = 0.01296)	FC431	The overall cost (energy, maintenance, repairs) of AVs will be reduced compared to traditional cars.	UESI questionnaire
5. **ENVIRONMENT** (w = 0.20840)	*5.1. NOISE (w = 0.19586)*	Perception of reduction of noise (w = 0.01431)	FC511	AVs will reduce noise in our cities and roads. (FC5 - Noise).	UESI questionnaire
	5.2. EMISSIONS (w = 0.34923)	Perception of reduction of ecological impact (w = 0.02716)	FC521	AVs will reduce the ecological impact (FC5 – Emissions)	UESI questionnaire
	5.3. PUBLIC HEALTH (w = 0.45490)	Perception of driving without steering wheel (w = 0.02369)	FC531	I will be happy to travel in a AVs without steering wheel	Observations

6. DESIGN OPTIONS (w = 0.07673)	*6.1. INFRASTRUCTURE (w = 0.30275)*	Perception of complexity of the whole system (w = 0.00741)	FC611	The whole system will be too complex (AVs and required infrastructure) (FC6 – Infrastructure)	UESI questionnaire
		Need to differentiate infrastructures with AVs operating (w = 0.00779)	FC612	The infrastructure where AVs move should be clearly and specifically identified and differentiated (FC6 - Infrastructure adaptation).	UESI questionnaire
	6.2. VEHICLE SHAPE (w = 0.11626)	Need to differentiate AVs from conventional cars (w = 0.00219)	FC621	Should be clearly differentiated from conventional car.	UESI questionnaire
		Need for optimization of aerodynamics (w = 0.00299)	FC622	Should optimize aerodynamics of the vehicle to increase energy efficiency.	UESI questionnaire
		Need for making easier access to PRM (w = 0.00381)	FC623	Should make easier the access of people with reduced mobility.	UESI questionnaire

	Positive assessment of incorporation of people to mobility who have problems with conventional cars (w = 0.00409)	FC624	AVs allow travelling people by car who has not the possibility to do so with conventional cars (elderly people, people with reduce mobility…) (FC6-Vehicule Shape)	UESI questionnaire
6.3. VEHICLE BEHAVIOUR (w = 0.34145)	Perception of safety of sportive driving (w = 0)	FC631	I feel "sportive conduction" is safe	UESI questionnaire
	Perception of safety of comfort driving (w = 0)	FC632	I feel "comfort conduction" is safe.	UESI questionnaire
	Overall preference of sportive driving (w = 0.00670)	FC633	I prefer a sportive driving on most of my AV displacements.	UESI questionnaire
	Overall preference of comfort driving (w = 0.00716)	FC634	I prefer a comfort driving on most of my AV displacements.	UESI questionnaire
	Perception of keeping control even on Avs (w = 0.00840)	FC635	For me is very important to keep a minimum sense of control of AVs even if I am not driving.	UESI questionnaire
	Comfort driving (w = 0.00818)	FC636a	Valence value with comfort driving(Fisio)	Observations
		FC636b	Arousal value with comfort driving(SAM)	Observations
		FC636c	Valence value with comfort driving(Fisio)	Observations

	FC636d	Arousal value with comfort driving(SAM)	Observations
Sportive driving (w = 0.00742)	FC637a	Valence value with sportive driving(Fisio)	Observations
	FC637b	Arousal value with sportive driving(Fisio)	Observations
	FC637c	Valence value with sportive driving(SAM)	Observations
	FC637d	Arousal value with sportive driving(SAM)	Observations
Perception of overall appropriateness of sportive driving (w = 0)	FC638	I feel "sportive conduction" is appropriate for AVs in most circumstances.	UESI questionnaire
Perception of in a hurry appropriateness of sportive driving (w = 0)	FC639	I feel "sportive conduction" is appropriate when I need to arrive on time	UESI questionnaire
Perception of excitement of sportive driving (w = 0)	FC6310	I feel "sportive conduction" is exciting	UESI questionnaire
Perception of overall appropriateness of comfort driving (w = 0)	FC6311	I feel "comfort conduction" is appropriate for AVs in most circumstances	UESI questionnaire
Perception of boredom of comfort driving (w = 0)	FC6312	I feel "comfort conduction" is boring	UESI questionnaire

Willing to compromise energy efficiency to reach destination faster (w = 0.00874)	FC6313	Energy efficiency	UESI questionnaire
Willing to compromise dynamic comfort to reach destination faster (w = 0.00688)	FC6314	Dynamic comfort of passengers	UESI questionnaire
Willing to compromise distance between vehicles to reach destination faster (w = 0.00642)	FC6315	Distance between vehicles to improve traffic flow and therefore reducing time to destination	UESI questionnaire
Willing to compromise traffic flow to reach destination faster (w = 0)	FC6316	Traffic flow to reduce my time to destination	UESI questionnaire
Importance of optimizing traffic flow to determine vehicle behavior (w = 0.00985)	FC6317	Optimize traffic flow in order to improve overall circulation.	UESI questionnaire
Importance of optimizing energy efficiency to determine vehicle behavior (w = 0.00974)	FC6318	Optimize energy efficiency in order to reduce contamination.	UESI questionnaire
Importance of optimizing well-being of other road users to determine vehicle behavior (w = 0.01168)	FC6319	Optimize the wellbeing of other road users (other cars, pedestrians, bikers...)	UESI questionnaire
Importance of reducing time to destination to determine vehicle behavior (w = 0.00793)	FC6320	Reduce time of arrival.	UESI questionnaire

Importance of optimizing dynamic comfort to determine vehicle behavior (w = 0.00921)	FC6321	Optimize the dynamic comfort of the passengers.	UESI questionnaire
Importance of facilitating the performance of other tasks (work) to determine vehicle behavior (w = 0.00773)	FC6322	Facilitate the performance of other tasks (work).	UESI questionnaire
Importance of facilitating the interaction with other passengers to determine vehicle behavior (w = 0.00714)	FC6323	Facilitate the interaction with other passengers.	UESI questionnaire
Importance of keeping control on type of conduction (w = 0.00907)	FC6324	To select type of conduction (example: more sportive vs. more comfort).	UESI questionnaire
Importance on selecting the route to final destination (w = 0.00826)	FC6325	To select route to final destination.	UESI questionnaire
Importance on fixing variables related to ecological impact (w = 0.00786)	FC6326	To select variables related with ecological impact.	UESI questionnaire
Importance on controlling speed (w = 0.00949)	FC6327	Speed	UESI questionnaire
Importance on fixing fulfillment traffic norms (w = 0.01004)	FC6328	Degree of fulfillment with traffic norms (example: example: not driving never under any situation through an amber traffic light, maintain always the safety distance…)	UESI questionnaire

	Importance on fixing inner comfort parameters (w = 0.00554)	FC6329	To select variables of interior comfort conditions.	UESI questionnaire
6.4. HUMAN MACHINE INTERFACE (w = 0.23954)	Preference for voice command under emergency situation (w = 0.00685)	FC641	Voice commands (1-5 emergency)	UESI questionnaire
	Preference for push buttons under emergency situation (w = 0.00385)	FC642	Physical push buttons (1-5 emergency)	UESI questionnaire
	Preference for text on display under emergency situation (w = 0.00535)	FC643	Text on display (1-5 emergency)	UESI questionnaire
	Preference for images on display under emergency situations (w = 0.00496)	FC644	Text and images on display (1-5 emergency)	UESI questionnaire
	Preference for combined text-voice-images on display under emergency situations (w = 0.00537)	FC645	Text, voice and images on display (1-5 emergency)	UESI questionnaire
	Preference for voice command under normal situation (w = 0.00762)	FC646	Voice commands (1-5 normal situation)	UESI questionnaire
	Preference for push buttons under normal situation (w = 0.00723)	FC647	Physical push buttons (1-5 normal situation)	UESI questionnaire
	Preference for text on display under normal situation (w = 0.00525)	FC648	Text on display (1-5 normal situation)	UESI questionnaire

Preference for images on display under normal situations (w = 0.00582)	FC649	Text and images on display (1-5 normal situation)	UESI questionnaire
Preference for combined text-voice-images on display under normal situations (w = 0.00517)	FC6410	Text, voice and images on display (1-5 normal situation)	UESI questionnaire
Importance on selecting the interactions modes (w = 0.00800)	FC6411	To select preferred interface interaction modes (voice, picture…).	UESI questionnaire
Importance of clearness of the information provided (w = 0.00905)	FC6412	Information provided by AV should be clear and easy to understand	UESI questionnaire
Preference on keeping information to the minimum expression (w = 0.00633)	FC6413	Information provided by the AVs should be keep to a minimum to reduce the number of disturbances	UESI questionnaire
Preference on keeping information to the maximum detail (w = 0.00460)	FC6414	I want detailed information of what is going on in my AV	UESI questionnaire
Relative importance of route information related (w = 0.00758)	FC6415	Information about the route like: time to destination, proposed path, traffic situation…	UESI questionnaire
Relative importance of leisure and entertainment (w = 0.00536)	FC6416	Leisure and entertainment: radio stations, music, movies, videogames...	UESI questionnaire

Relative importance of comfort parameters (w = 0.00558)	FC6417	Information about comfort parameters: climatic parameters inside the car.	UESI questionnaire
Relative importance of conduction mode (w = 0.00582)	FC6418	Information about the driving characteristics: comfort or sportive mode	UESI questionnaire

Table S3. BNs variables and hierarchical model (level 1, 2 and 3) of fairness characteristics analyzed for use case 3 bicycle sharing stations. Weights (w) are included between parenthesis, normalized weights for level 1 and 2 FC, and global normalized weights for level 3. Note: Those FCs with a weight of 0 is due to a lack of data or because the data gathered had the same value and did not allow performing the BN analysis.

FC Level 1	FC Level 2	FC Level 3	Code	BNS variable	Data source
1. ACCESSIBILITY AND SPONTANEITY (w = 0.25)	*1.1. MEMBERSHIPS COSTS (w = 0.09067)*	Entry cost (upfront cost) (w = 0.00618)	FC111a	Type of subscription/Pass	UESI questionnaire
			FC111c	Entry cost of bike sharing schemes	Dataset (Proprietary data)
			FC111b	User evaluation (Likert scale 1-7) of the affordability of the entry cost of bike share services	UESI questionnaire
		Rental charges for trips above one hour (w = 0.00429)	FC112b	Rental charges above half an hour	Dataset (Proprietary data)
			FC112a	User perception (Likert scale 1-7) of long rental charges	UESI questionnaire
		Annual membership cost (w = 0.00285)	FC113b	Annual membership cost of schemes	Dataset (Proprietary data)
			FC113a	Annual membership cost of schemes	UESI questionnaire
			FC113c	User perception (Likert scale 1-7) about the affordability of annual membership cost	UESI questionnaire
		Accessories cost (helmet, clothing etc.) (w = 0.00501)	FC114b	Type of safety gear supplied by operators	Dataset (Proprietary data)
			FC114a	User perception availability of cycling safety gears for users	UESI questionnaire

		FC114c	User perception availability of cycling safety gears for users	Social media
	Insurance (liability resulting from overage fees, damages and theft of the bike) (w = 0.00961)	FC115c	Nature and type of insurance cover for bikes and users (i.e. damages, theft, accidents etc.)	Dataset (Proprietary data)
		FC115b	Yes/No: Whether there exist insurance against liability	UESI questionnaire
		FC115a	User appreciation of the insurance regime of bike sharing schemes	UESI questionnaire
1.2. SPONTANEITY JOF ACCESSING BIKE/DOCK (w = 0.11137)	The availability of a shared bike and a vacant dock when required (w = 0.00890)	FC121b	Number of vacant bikes at the docking station (during observation)	Observations
		FC121a	Users evaluation (Likert scale 1-7) about the availability of a shared bike when required	UESI questionnaire
	Reliability of bike sharing services to meet mobility needs (w = 0.01129)	FC122	User evaluation (Likert scale 1-7) of the reliability of bike sharing services	UESI questionnaire

Availability and coverage of docking stations (w = 0.00953)	FC123	User evaluation (Likert scale 1-7) of the availability and proximity of bike sharing stations in their neighborhood	UESI questionnaire
Coverage at major transport hubs (w = 0.00241)	FC124c	Number or % of docking stations at transport hubs	Dataset (Open data)
	FC124b	Number or % of transport hubs with docking stations	Dataset (Open data)
	FC124a	Number of other public modes of transport near the docking station	Observations
Efficient planning and sufficient distribution of bikes to low-income and minority communities (w = 0)	FC125a	Number of low-income and minority neighborhoods with docking stations	Dataset (Open data)
	FC125b	Is it a low-income/minority neighborhood? (Yes/No)	Observations
	FC125c	Number of docking stations in the neighborhood	Observations
Easy access to bike (easy booking, unlocking and payment system) (w = 0.00936)	FC126	User evaluation (Likert scale 1-7) of the ease of accessing bikes	UESI questionnaire

1.3. PROXIMITY OF DOCKING STATIONS (w = 0.14677)	Spatial distribution and strategic location of docking stations (w = 0)	FC131	User evaluation (Likert scale 1-7) of the availability and proximity of bike sharing stations in their neighborhood	UESI questionnaire
	Distribution of bike-sharing services to minority and low-income communities (w = 0.00600)	FC132b	Number or % of minority/low-income neighborhoods with bike share stations	Dataset (Open data)
		FC132a	There is a bike sharing station within residential and low-income neighborhoods	UESI questionnaire
	Inclusive spatial distribution of bikes and docking station (w = 0)	FC133	User perception (Likert scale 1-7) of the inclusivity of the location of bike stations	UESI questionnaire
	Spatial distribution of bike-sharing and docking stations close to residential and low-income neighborhood (w = 0)	FC134a	Number of Bike-sharing stations in low-income and minority neighborhoods	Dataset (Open data)
		FC134b	Is it a low-income/minority neighborhood? (Yes/No)	Observations
		FC134c	Number of docking stations in the neighborhood	Observations
	Strategic location/ spatial distribution of bike docking stations (w = 0.01422)	FC135	User evaluation (Likert scale 1-7) of the convenience of the locations / spatial distribution of docking stations	UESI questionnaire

1.4. INSUFICIENT INFRASTRUCTURE (w = 0.27039)	Comprehensive and attractive bicycle network (separate and safe cycle paths) that allows trip-chaining, and enables cycling with children (w = 0.02685)	FC141	Yes/No: Whether cycle network encourage or discourage cycling (i.e. permits trip chaining and cycling with children)	UESI questionnaire
	Adequate bicycle infrastructure (docks and cycle facilities) (w = 0)	FC142a	User level of satisfaction (Likert scale 1-7) with the existing bike network	UESI questionnaire
		FC142b	User level of satisfaction (Likert scale 1-7) with the existing docking stations and facilities	UESI questionnaire
	Sheltered docking station (w = 0.02960)	FC143b	No. or % of docking stations with shelter	Dataset (Proprietary data)
		FC143a	Docking stations with shelter (Yes/No)	Observations
	Attractive changing facilities (w = 0.01148)	FC144a	Yes/No: whether the docking station has changing facilities	Observations
		FC144b	Yes/No: Availability of end of trip changing facilities	UESI questionnaire
		FC144c	if Yes: User evaluation of the suitability of the changing facilities (measured on a Likert scale)	UESI questionnaire
	Improved cycling infrastructure (w = 0)	FC145	-	-

	Toilet facilities at the bike docking stations (w = 0.01440)	FC146b	Number or % of docking stations with women facilities	Dataset (Proprietary data)
		FC146c	Yes/No: whether docking stations have women facilities	UESI questionnaire
		FC146a	Yes/No: whether the docking station has toilet facilities	Observations
		FC146d	Yes/No: whether the docking station has women toilets	Observations
1.5. SIGN-UP AND BOOKING PROCESS (w = 0.07680)	Possibility to have access to share and pay a bicycle or other vehicle (w = 0)	FC151	-	-
	Simple and flexible signing-up process (w = 0.00715)	FC152	End-user evaluation (Likert scale 1-7) of the flexibility of the signup process of bike sharing schemes	UESI questionnaire
	The requirement to sign-up for membership (credit/debit card, internet access and smart phone) (w = 0.00534)	FC153a	Do you need any requirement for signing-up for membership?	Dataset (Proprietary data)
		FC153b	Type of requirement for signing-up for membership	Dataset (Proprietary data)
		FC153c	Is it required a users' account of sign-up to use the service? (Yes/No)	UESI questionnaire

	Availability of cash payment option (Availability cash membership) (w = 0.00712)	FC154c	No. or % of bike sharing members paying by cash	Dataset (Proprietary data)
		FC154b	Yes/No About the possibility of paying by cash	UESI questionnaire
		FC154a	Users' experience of cash payment option /membership (Likert scale 1-7)	UESI questionnaire
1.6. TRAVELLING WITH CHILDREN OR CARRYING THINGS (w = 0.17476)	A well-planned bicycle infrastructure that allows trip-chaining (w = 0.01873)	FC161a	End users' evaluation (Likert scale 1-7) about how easy is to find a bike for trip chaining	UESI questionnaire
		FC161b	Yes/No: The suitability of the existing cycle network for trip-chaining	UESI questionnaire
	Availability of bikes with child seat, trailers and carriages for travelling with children and carrying baggage (w = 0.01672)	FC162b	No. or % of bikes with child seat, trailers and carriages for travelling with children and carrying luggage	Dataset (Proprietary data)
		FC162c	No. or % of bikes with child seat, trailers and carriages for travelling with children	Observations
		FC162d	No. or % of bikes with child seat, trailers and carriages for carrying luggage	Observations

		FC162a	Yes/No: Availability of accessories for cycling with children and cargo	UESI questionnaire
	Public education and creating general awareness about the possibility of cycling with children and baggage (w = 0.01901)	FC163	Yes/No: User awareness of public awareness/ education on cycling with children and luggage	UESI questionnaire
	Practical cycling lessons (cycling with children and baggage) (w = 0.01790)	FC164a	Yes/No: Participants awareness of practical cycling programs	UESI questionnaire
		FC164b	No. Of cycling programs/lessons	Dataset (Proprietary data)
1.7. PUBLIC AWARENESS	Creating public awareness about practical cycling (cycling with children and cargo) (w = 0.01266)	FC171	End user awareness (Likert scale 1-7) of practical cycling (with children and cargo) and cycling facilities	UESI questionnaire
	Creating public awareness of cycling routes (w = 0.01426)	FC172b	Number of public campaigns on cycling in the past year	Dataset (Proprietary data)
		FC172a	User awareness (Likert scale 1-7) of the cycle network in their neighborhood	UESI questionnaire
	Advertising bike sharing services and locations of docking stations (w = 0.00827)	FC173	Number of adverts on the bike sharing service in the past year	Dataset (Proprietary data)

2. SAFETY AND SECURITY (w = 0.25)	*2.1. TRAFFIC SAFETY (w = 0.21068)*	Dedicated and mandatory cycle lanes on roads (w = 0.00527)	FC211b	% of roads with dedicated and enforced bike lanes	Dataset (Open data)
			FC211a	Are there sufficient cycling infrastructure in the neighborhood of the station?	Observations
			FC211c	Has the docking station a dedicated/enforced bike lane near? (Yes/No)	Observations
		Physically separated cycle paths from vehicular traffic (w = 0)	FC212a	% of roads with physically separated bike lanes from vehicular traffic	Dataset (Open data)
			FC212b	Has the docking station a physically separated bike lane near? (Yes/No)	Observations
		Safe cycling paths for cycling with children (w = 0.01549)	FC213b	User evaluation (Likert scale 1-7) about the safety of cycle paths for cycling with children	UESI questionnaire
			FC213a	Safety of cycle paths for cycling with children	Social media
		Educating drivers and cyclist on their responsibilities of ensuring safety on the road (w = 0)	FC214	Number of cycling training programs to educate cyclist on their responsibilities of ensuring safety on the road	Dataset (Proprietary data)

	Safety of the environment around the cyclist to prevent accident (w = 0.02034)	FC215	User evaluation(Likert scale 1-7) about the safety of cycling in the neighborhood	UESI questionnaire
2.2. SEPARATE INFRASTRUCTURE (w = 0.19979)	Separate cyclist from vehicular traffic (w = 0.01014)	FC221b	% of bike network segregated from vehicular traffic	Dataset (Open data)
		FC221a	Yes/No existence of separate cycle infrastructure	Observations
	Segregated cycle routes (w = 0.01969)	FC222	User evaluation (Likert scale 1-7) about being more comfortable cycling on segregated routes than sharing the road space with cars	UESI questionnaire
2.3. SAFE ENVIRONMENT AND PERSONAL SAFETY (w = 0.21698)	Visibility and adequate lighting on cycle paths and lanes (w = 0.01830)	FC231c	User evaluation (Likert scale 1-7) of the visibility of cycle networks and stations	UESI questionnaire
		FC231a	Are there cycle paths and lanes well illuminated at night?	Observations
		FC231b	How safe are the cycle paths and lanes for cycling at night?	Observations
	Presence of CCTV	FC232c	No. of CCTV	Dataset (Proprietary data)

systems to improve user perception of security (w = 0.00613)	FC232b	User evaluation (Likert scale 1-7) regarding presence and visibility of CCTV system	UESI questionnaire
	FC232a	Yes/No: about presence and visibility of CCTV system on cycle paths and at stations	Observations
Presence of security devices (w = 0.01755)	FC233c	No. of security devices	Dataset (Proprietary data)
	FC233b	Are there any other security devices in addition to the CCTV?	Observations
	FC233a	User evaluation (Likert scale 1-7) regarding presence and visibility of CCTV system	UESI questionnaire
The visibility of the cyclist to other road users (w = 0.01979)	FC234a	User evaluation (Likert scale 1-7) of the lighting/visibility at docking stations is adequate at night	UESI questionnaire
	FC234b	% of users wearing hi-vis cycling gear	Observations
Roadworthiness of the shared bikes (well-functioning bikes and lights on bikes) (w = 0.00741)	FC235b	Number and Percentage of bikes with well-functioning brakes	Dataset (Proprietary data)
	FC235a	% of road worthy bikes among the bike fleet	Observations

	Set up information point at bike sharing and docking stations to provide cyclists personal safety tips (w = 0)	FC236	Number of information points established to provide cyclist's with information and safety tips	Dataset (Proprietary data)
	Lowering traffic speeds on roads with on-road cycle lanes (w = 0.01217)	FC237c	Speed limits on roads with cycle lanes	Dataset (Open data)
		FC237b	Speed limit on nearby roads with cycle lanes (docking station)	Observations
		FC237d	Speed limits on roads with cycle lanes	Social media
		FC237a	User evaluation (Likert scale 1-7) about lowering traffic speeds on roads with cycle lanes will make me feel safer to cycle/use bike share	UESI questionnaire
2.4. HARRASSMENT (w = 0.09113)	Visibility of the cycle paths and stations (w = 0.00977)	FC241a	User evaluation (Likert scale 1-7) of the lighting/visibility at docking stations is adequate at night	UESI questionnaire
		FC241b	Yes/No: about visibility of cycle networks and stations	Observations
	Gender sensitive training for other road users (drivers) (w = 0)	FC242	-	-

	Public awareness campaigns (w = 0.00794)	FC243a	No. of public campaigns to discourage harassment cyclist	Dataset (Proprietary data)
		FC243b	User awareness (Likert scale 1-7) of the cycle network in their neighborhood	UESI questionnaire
	Presence of CCTV systems (w = 0)	FC244a	Number and Percentage of docking stations with security devices (CCTV etc.)	Dataset (Proprietary data)
		FC244b	User evaluation (Likert scale 1-7) regarding presence and visibility of CCTV system (measured on a Likert scale).	UESI questionnaire
		FC244c	Yes/No: about presence and visibility of CCTV system on cycle paths and at stations.	Observations
2.5. DRIVER BEHAVIOUR (w = 0.20341)	Improved cycle infrastructure (w = 0)	FC251	-	-
	Educating drivers on the right of the cyclist and their responsibility of ensuring safety on the road (w = 0.02030)	FC252b	No. of cycling training programs	Dataset (Proprietary data)
		FC252a	User perception (Likert scale 1-7) about the behavior of drivers towards cyclist	UESI questionnaire
	Physical separation of bike paths or lanes from vehicular traffic (w = 0.01570)	FC253c	% of bike network segregated from vehicular traffic	Dataset (Open data)
		FC253b	Yes/No existence of separate cycle infrastructure near the docking station	Observations

		FC253a	The effect (Likert scale 1-7) of sharing the road space with cars as cyclist is on segregated lane	UESI questionnaire
2.6. CONFIDENCE AND EXPERIENCE (w = 0.07801)	Physically separated bike paths or lanes from vehicular traffic (w = 0.00571)	FC261d	% of bike network segregated from vehicular traffic	Dataset (Open data)
		FC261b	Yes/No existence of separate cycle infrastructure near the docking station	Observations
		FC261a	The effect (Likert scale 1-7) of segregated bike network from vehicular traffic on user behavior	UESI questionnaire
	Lowering traffic speeds on roads with on-road cycle lanes (w = 0.00711)	FC262a	Speed limits on roads with cycle lanes	Dataset (Open data)
		FC262b	Speed limits on roads with cycle lanes near the docking station	Observations
		FC262c	User perception (Likert scale 1-7) about lowering traffic speeds on roads with cycle lanes will make me cycle/use bike share more	UESI questionnaire
	Lessons on cycling to boost confidence (w = 0.00829)	FC263b	Cycling training programs organized in a year to increase cyclists' confidence	Dataset (Proprietary data)

			FC263a	Yes/No: User awareness of cycling training programs in their locality	UESI questionnaire
3. SOCIAL CONSTRAINS (w = 0.25)	*3.1. SOCIO-CULTURAL CONSTRAINS (w = 0.26654)*	Public awareness campaign on the benefits of cycling to demystify the myth about cycling in low-income and minority neighborhoods (w = 0.02588)	FC311	No. of bike-share or cycling campaigns targeted at low-income and minority groups or neighborhoods	Dataset (Proprietary data)
		Better and safe cycling facilities to encourage cycling with children (w = 0.02885)	FC312	User evaluation (Likert scale 1-7) of the safety of the existing cycle infrastructure for cycling with children	UESI questionnaire
		Promote cycling as a legitimate form of transportation (w = 0.02727)	FC313	Participants' perception (Likert scale 1-7) about using bike-share or cycling to meet their mobility needs	UESI questionnaire
	3.2. SUBJECTIVE NORM (w = 0.29915)	Availability of end-of-trip cycling facilities (w = 0.03044)	FC321	User evaluation (Likert scale 1-7) of availability of end-of-trip cycling facilities for users	UESI questionnaire
		Public awareness campaign on the benefits of cycling (w = 0.02567)	FC322	Yes/No: User awareness of the benefit of cycling	UESI questionnaire

	3.3. FAMILY RESPONSIBILITIES (w = 0.43431)	Education on practical cycling (cycling with children and cargo) (w = 0.04509)	FC331b	No. of practical cycling training programs organized in a year	Dataset (Proprietary data)
			FC331a	Yes/No: User awareness of practical cycling training programs in their locality	UESI questionnaire
		Safe cycle routes for cycling with children (w = 0.03692)	FC332	User evaluation (Likert scale 1-7) of the safety of the existing cycle infrastructure for cycling with children	UESI questionnaire
		Bikes with child seats and trailers for carrying kids and carting cargo (w = 0.04627)	FC333b	Are there bikes with child seat, trailers and carriages for travelling with children and carrying luggage	Observations
			FC333a	Yes/No: Availability of accessories for cycling with children and cargo	UESI questionnaire
4. WEATHER AND TOPOGRAPHY (w = 0.25)	*4.1. TOPOGRAPHY (w = 0.56089)*	Electric bikes in bike-share fleet (w = 0.05049)	FC411b	No. or % of e-bikes in bike-share fleet	Observations
			FC411c	No. or % of e-bikes in operator's bike-share fleet	Dataset (Proprietary data)
			FC411a	Yes/No: whether user can access e-bike from operator	UESI questionnaire
		Avoid hilly terrain in the development of cycle networks where	FC412b	Yes/No: whether part of the cycle network is on hilly terrain	UESI questionnaire

	possible (w = 0.06102)	FC412a	Users' evaluation (Likert scale 1-7) about hilly terrains deter from cycling	UESI questionnaire
4.2. WEATHER (w = 0.43911)	All weather cycle-friendly infrastructure (w = 0.04934)	FC421a	Is the cycle network nearby the docking station weather cycle friendly? (Yes/No)	Observations
		FC421b	% of cycle network that is all weather cycle friendly	Dataset (Proprietary data)
	Cycling rain Poncho (w = 0.04643)	FC422a	User perception (Likert scale 1-7) about the effect of rain on cycling	UESI questionnaire
		FC422b	User perception (Likert scale 1-7) about the availability of cycling raincoats (ponchos) for interested users on rainy days would be relevant	UESI questionnaire
		FC422c	Yes/No: Availability of cycling raincoats for users	Observations

Table S4. BNs variables and hierarchical model (level 1, 2 and 3) of fairness characteristics analyzed for use case 4 employment in the transport sector. Weights (w) are included between parenthesis, normalized weights for level 1 and 2 FC, and global normalized weights for level 3. Note: Those FCs with a weight of 0 is due to a lack of data or because the data gathered had the same value and did not allow performing the BN analysis.

FC Level 1	FC Level 2	FC Level 3		Variable	Data source
1. SOCIO-ECONOMIC CONDITIONS (w = 0.25949)	*1.1. JOB SEGREGATION (w = 0.27930)*	All jobs are available and suitable for both men and women (and there is a more equal balance between genders across all occupations, levels and jobs in transport) (w = 0.03985)	FC111c	N[a] % women employees	Dataset (Propietary data)
			FC111d	% men employees	Dataset (Propietary data)
			FC111e	% women managers	Dataset (Propietary data)
			FC111f	% men managers	Dataset (Propietary data)
			FC111g	% women directors	Dataset (Propietary data)
			FC111h	% men directors	Dataset (Propietary data)
			FC111b	Employees´evaluation (e.g. Likert scale 1-7): All jobs are available and suitable for both men and women	UESI questionnaire
			FC111a	Employees´evaluation (e.g. Likert scale 1-7): There is currently an equal balance between genders across occupations, levels and jobs	UESI questionnaire
		On the job training for men and women to negate cultural stereotypes associated with women and specific	FC112a	Number of courses training to avoid cultural stereotypes (last 3 years)	Dataset (Propietary data)

roles and tasks in the transport sector (w = 0.03033)	FC112b	Where I work there is a good level of acceptance of female employees by male colleagues	UESI questionnaire
School visits, open days, etc. to attract more women to the sector (w = 0.00982)	FC113b	Number of school visits/open days per year (last 3 years)	Dataset (Propietary data)
	FC113a	Employees´ evaluation (e.g. Likert scale 1-7): There are existing initiatives with schools, colleges, and the universities that attract more women to the transport sector.	UESI questionnaire
Promoting a more gender-balanced career orientation: among students 'women-only' open days; and in general (w = 0.02337)	FC114a	Employees´ evaluation (e.g. Likert 1-7): Role models advertising in careers where traditionally less gender balance is achieved	UESI questionnaire
	FC114b	Employees´ evaluation (e.g. Likert 1-7): Laws and policies support equal opportunity in terms of recruitment and promotion for both female and male candidates.	UESI questionnaire
Ensuring gender pay equality for equivalent positions (w = 0.03253)	FC115a	Average salary (per month or year) of all men employees	Dataset (Propietary data)
	FC115b	Average salary (per monthh or year) of all women employees	Dataset (Propietary data)

	FC115c	Rate of salary women/men of employees	Dataset (Propietary data)
	FC115d	Average salary (per monthh or year) of all women managers	Dataset (Propietary data)
	FC115e	Average salary (per monthh or year) of all men managers	Dataset (Propietary data)
	FC115f	Rate of salary women/men of managers	Dataset (Propietary data)
	FC115g	Average salary (per month or year) of all women directors	Dataset (Propietary data)
	FC115h	Average salary (per month or year) of all male directors	Dataset (Propietary data)
	FC115i	Rate of salary women/men of directors	Dataset (Propietary data)
Regularly reviewing the recruitment process for unconscious bias (w = 0)	FC116	Is there any procedure to review the fairness/equity in recruitment processes? (Yes/No)	Dataset (Propietary data)

1.2. DEMAND FACTORS (w = 0.36675)	Gender neutral recruitment policies should be in place (w = 0)	FC121	Is there in place a gender neutral recruitment policy? (Yes/No)	Dataset (Propietary data)
	Design job offers so that both men and women can apply (w = 0)	FC122	Are job offers designed to attract both men and women? (Yes/No)	Dataset (Propietary data)
	Employment opportunities should be advertised widely and all applications welcomed (w = 0.014938)	FC123	Number of opportunities advertised in the last 3 years	Dataset (Propietary data)
	Targeted recruitment campaigns seek to reduce gender segregation (w = 0)	FC124	Does the organization conduct targeted recruitment campaigns? (Yes/No)	Dataset (Propietary data)
	Ensure employment decisions are based on objective issues related to the job (w = 0.03628)	FC125	Where I work there is a company culture that promotes diversity as the accepted norm	UESI questionnaire
1.3. POLICY/ LEGAL (w = 0.35395)	Equal employment policies: Policies are used within the organization to support fair recruitment and promotion processes for women, and meet national legal requirements	FC132a	Employees´ evaluation (e.g. Likert 1-7): how satisfied are you that the country you live in supports fairness and inclusiveness of women in transport.	UESI questionnaire

(including Equal Employment policies) (w = 0.02380)	FC132b	My company meets all current Employment legislation requirements to support individuals with special intellectual needs	UESI questionnaire
	FC132c	My company meets all current Employment legislation requirements to support individuals with special physical needs	UESI questionnaire
Family friendly policies – maternity and paternity leave (w = 0.05155)	FC133i	% of women with maternity leaving (in the last 3 years)	Dataset (Propietary data)
	FC133j	% of men with paternity leaving (in the last 3 years)	Dataset (Propietary data)
	FC133k	Duration of maternity leaving (weeks) (2019)	Dataset (Propietary data)
	FC133f	Number of women normally working flexibly (including home working and flexible start and fiinsh times) [post-Covid]	Dataset (Propietary data)
	FC133h	Number of men normally working flexibly (including home working and flexible start and finish times) [post=Covid]	Dataset (Propietary data)
	FC133d	Number of employees with caring responsibilities	Dataset (Propietary data)
	FC133b	% of men working part time	Dataset (Propietary data)

			FC133c	% of women working part time	Dataset (Propietary data)
			FC133e	Number of women normally working flexibly (including home working and flexible start and finish times) [pre-Covid]	Dataset (Propietary data)
			FC133g	Number of men normally working flexibly (including home working and flexible start and finish times) [pre-Covid]	Dataset (Propietary data)
2. JOB CHARACTERISTICS (w = 0.27138)	*2.1. HR POLICIES (w = 0.20890)*	Targeted recruitment campaigns (w = 0)	FC211	Number of recruitment campaigns targeted to women (in the last 3 years)	Dataset (Propietary data)
		Organizations should ensure that they maintain a gender mix among its newly hired managers, and plan for identifying obstacles hindering career development of women (w = 0.021312)	FC212a	% female new employees (in the last 3 years)	Dataset (Propietary data)
			FC212b	% male new employees (in the last 3 years)	Dataset (Propietary data)
			FC212c	% female new managers (in the last 3 years)	Dataset (Propietary data)
			FC212d	% male new managers (in the last 3 years)	Dataset (Propietary data)
			FC212e	% female new directors (in the last 3 years)	Dataset (Propietary data)
			FC212f	% Male new directors (in the last 3 years)	Dataset (Propietary data)

Integrate the company's commitment to gender equality into all of its communication activities and HR policies (w = 0.02138)	FC214	My company's HR policies facilitate fair recruitment, and promotion for women in the workplace (Likert 1-7)	UESI questionnaire
Ensure that the male–female ratio of internal promotions in different job categories is in line with the average male–female ratio of the company staff (w = 0.00560)	FC215a	Number of women non-managers who have been promoted (internally) in the last 3 years	Dataset (Propietary data)
	FC215b	Number of men non-managers who have been promoted in the last 3 years	Dataset (Propietary data)
	FC215c	Number of women who have been promoted to managers in the last 3 years	Dataset (Propietary data)
	FC215d	Number of men who have been promoted in the last 3 years	Dataset (Propietary data)
	FC215e	Number of women who have been promoted to directors in the last 3 years	Dataset (Propietary data)
	FC215f	Number of men who have been promoted to directors in the last 3 years	Dataset (Propietary data)
Improved maternity provisions and re-entry policy (w = 0.02495)	FC216a	My company's terms and conditions support maternity leave (Likert 1-7)	UESI questionnaire
	FC216b	My company's terms and conditions support paternity leave (Likert 1-7)	UESI questionnaire

		FC216c	My company's terms and conditions support employees in their caring role, i.e. family friendly policies (Likert 1-7)	UESI questionnaire
		FC216d	In my company there is prevention of dismissal or demotion during and after maternity periods (Likert 1-7)	UESI questionnaire
	Place someone in charge - assigning the responsibility to a specific person or body to identify, put in motion and monitor the actions that can be taken to advance the position of women within a company (w = 0)	FC217	Is there a person or body in charge of developing and monitor actions to advance the position of women within a company?	Dataset (Propietary data)
2.2. TERMS AND CONDITIONS (w = 0.18162)	Safe working environments for women (sexual harassment, violence etc.) (w = 0.01619)	FC221a	I feel comfortable and accepted in my current work environment (Likert 1-7)	UESI questionnaire
		FC221b	In my company females employees are accepted by the public using transport	UESI questionnaire
	Formal recognition of sexual harassment claims (w = 0)	FC222	Number of tools to collect sexual harassment claims	UESI questionnaire

	Part time workers provided with the same safeguards of employment as full time workers (w = 0.01012)	FC223	In my company part time and flexible workers have equal opportunity for promotion (Likert 1-7)	UESI questionnaire
	Personal development training (w = 0.02183)	FC224	My training and development needs are met as much as other people in my organization	UESI questionnaire
	Support the professional progression of women (w = 0.01441)	FC226	My company facilitate up-skilling and training of women for roles that are more male dominant	UESI questionnaire
	Employment terms and conditions support a work-life balance (w = 0.005944)	FC227	My company offers flexible Working Hours e.g. Teleworking / Working from home arrangements to all employees (Likert 1-7)	UESI questionnaire
2.3. FEMALE FACILITIES (w = 0.19224)	Provision of female toilets and showers were required (w = 0.00966)	FC231b	% of separated toilets	Dataset (Propietary data)
		FC231a	In my workplace the provision for female facilities (female toilets and showers etc.) are appropriate (Likert 1-7)	UESI questionnaire

	Provision of suitable female PPE (w = 0)	FC232	My company have provided me with equipment or uniforms or protective work-wear designed and suited for women (Likert 1-7)	UESI questionnaire
	Segregated changing rooms (w = 0)	FC233	Number of separated changing rooms	Dataset (Propietary data)
	Breast feeding rooms (w = 0)	FC234	My company can provide facilities for breastfeeding mums (Likert 1-7)	UESI questionnaire
2.4. TRAINING PROVISION (w = 0.19430)	Women and men should have equal access to all training programs (w = 0.02212)	FC241	In my workplace all employees have equal access to all training programs (Likert 1-7)	UESI questionnaire
	A flexible training system to be introduced (w = 0.02354)	FC242b	Number of flexible training systems (e.g. online courses, courses with flexible timetable, etc.)	Dataset (Propietary data)
		FC242a	My company provides special training and re-skilling after career breaks/maternity leave if required	UESI questionnaire
	Training and policies to promote a cultural change among all colleagues and managers (w = 0.01686)	FC243	My company provides cultural sensitivity training (Likert 1-7)	UESI questionnaire

	Training for all involved in key decision-making roles in relation to potentially discriminating practices (w = 0.02214)	FC244	My company provides training about unconscious bias in employment (Likert 1-7)	UESI questionnaire
	Continually assessing the relevance and quality of training institutions and programs (w = 0)	FC245	Is it implemented a method or procedure to evaluate the quality of the training? (Yes/No)	Dataset (Propietary data)
2.5. SAFETY AND SECURITY (w = 0.22294)	Regulations and education regarding sexual harassment between colleagues (w = 0.01973)	FC251	My working environment protects women from violence/harassment/assault (Likert 1-7)	UESI questionnaire
	Applying and actively communicating a zero-tolerance policy to sexual harassment (w = 0)	FC252	Number of communications about zero tolerance (in the last 3 years)	Dataset (Propietary data)
	Safety equipment - CCTV cameras, panic buttons, anti-theft equipment, closed cabins etc. to protect drivers and other personnel from aggressive third-party behavior (w = 0.01607)	FC254	In my work place we have adequate safety equipment - CCTV cameras, panic buttons etc. (Likert 1-7)	UESI questionnaire
	Security staff available to intervene in case of need (w = 0.03337)	FC255	Number of personnel from a security company present in the facilities	Dataset (Propietary data)

3. PERSONAL CIRCUMSTANCES (w = 0.22056)	*3.1. CARING AND PARENTING RESPONSIBILITIES (w = 0.38024)*	Supported career/carer breaks (w = 0.03007)	FC311	I require support in my workplace for dealing with chronic/long-term health conditions of those I care for (Likert 1-7)	UESI questionnaire
		Those with small children to be given the opportunity to change shifts or to reduce their working time (w = 0.04745)	FC313a	Number of people with children under 5 years with change shifts or reduced working time (in the last 3 years)	Dataset (Propietary data)
			FC313b	Number of people with children under 5 years without change shifts or reduced working time (in the last 3 years)	Dataset (Propietary data)
		Employees with small children to choose whether or not to continue working overtime (w = 0.02994)	FC314	In my workplace I regularly need to exceed my working hours (Likert 1-7)	UESI questionnaire
		Where possible, leave periods are reconciled with school holidays (w = 0)	FC315	Within my company it is possible to adapt my leave/holiday periods with the school holidays of my children (Likert 1-7)	UESI questionnaire
		Part-time work, flexible working hours, and work from home options (w = 0.03103)	FC316	I require working times that make it possible to accommodate work and family commitments (extended hours, variable start/ finish times, shift-work etc. (Likert 1-7)	UESI questionnaire

3.2. ECONOMIC DEPRIVATION (w = 0.28680)	Have access to funds to travel to work (w = 0.02288)	FC321	I require better financial support for expenses related to travel to work (Likert 1-7)	UESI questionnaire
	Affordable child/social care (w = 0.02683)	FC322	I require better access to flexible and affordable childcare services (Likert 1-7)	UESI questionnaire
	Public transport and flexible and adaptable jobs (w = 0.02665)	FC323	I require better access to the public/private transport to travel to work (Likert 1-7)	UESI questionnaire
	Minimum hourly rate for low skilled part time work (w = 0)	FC324	Minimum hourly rate for low skilled part time work	Dataset (Propietary data)
3.3. ACCESS TO RESOURCES (w = 0.33296)	Fewer job choices (w = 0.02409)	FC331a	In my environment I feel the need for better access to professional qualification (Likert 1-7)	UESI questionnaire
		FC331b	In my environment I feel the need for better access to promotion opportunities (Likert 1-7)	UESI questionnaire

			FC331c	In my environment I feel the need for better access to education to support my career goals (Likert 1-7)	UESI questionnaire
			FC331d	In my environment I feel the need for role models (Likert 1-7)	UESI questionnaire
		Choice of residence favors partner's job location (w = 0)	FC332	Do you choose your job influenced by your residence location? (Yes/No)	UESI questionnaire
		Increased commuting time (w = 0)	FC333	Time to go to work (minutes)	UESI questionnaire
		Availability and cost of public transport (w = 0)	FC334	Average cost to arrive to work per day (€)	UESI questionnaire
		Timetabling of transport (does it suit working hours?) (w = 0)	FC335	Level of satisfaction with the frequency of public transport (Likert 1-7)	UESI questionnaire
		Multiple trips to and from work (e.g. for childcare, shopping etc.) (w = 0)	FC336	Number of trips from home to work due to childcare, shopping…	UESI questionnaire
		Access to private or shared vehicle (w = 0)	FC337	Do you have access to private vehicle? (Yes/No)	UESI questionnaire
CH	**AR**	**ACT**	**ERI**	*4.1. SKILLS (w = 0.2100)*	Strategic skills development framework (w = 0.02086)	FC411	I require specific skills training during work to access job opportunities and progression (Likert 1-7)	UESI questionnaire

		Build solid bridges between the world of work and training providers in order to match skills provision to the needs of enterprises (w = 0)	FC413	Is there any cooperation established between the world of work and training providers within your entity? (Yes/No)	Dataset (Propietary data)
		Continuous workplace training and lifelong learning (w = 0.01957)	FC414	I require more experience in specific roles to access job opportunities and progression (Likert 1-7)	UESI questionnaire
		Anticipating and building competencies for future needs (w = 0)	FC415	How important do you think is to anticipate and build new competencies for future needs? (Likert 1-7)	UESI questionnaire
		Ensuring broad access to training opportunities, for women and men, and particularly for those groups facing greater difficulties (w = 0.02365)	FC416	My need to progress in my career in my workplace is affected by having a long-term illness/disability (Likert 1-7)	UESI questionnaire
	4.2. ADAPTABILITY (w = 0.17275)	Extended hours, variable start/ finish times, shift-work, and 24/7 operations sometimes for 365 days a year) make it difficult and at times impossible to reconcile work and family commitments (w = 0)	FC421	I have the opportunity to change my role within my organization to accommodate my needs (Likert 1-7)	UESI questionnaire
		Child care arrangements (nursery/school hours) (w = 0.01756)	FC422	I have the capability to accommodate changing shifts and or working time in my workplace according to my needs (e.g. childcare arrangements) (Likert 1-7)	UESI questionnaire

4.3. EDUCTIONAL LEVEL AND ATTAINMENT (w = 0.22003)	Good-quality basic education for all is an essential prerequisite for further skills development (w = 0)	FC431	How important do you consider education is for further skills development? (Likert 1-7)	UESI questionnaire
	Links between organizations, schools and colleges to ensure education and training is suited to the demands of the work place - anchor the world of learning in the world of work (w = 0)	FC432	I feel universities/training courses are adapted to the jobs demands (Likert 1-7)	UESI questionnaire
	Lifelong learning - enabling women and men of all ages to fulfill their aspirations (w = 0.02131)	FC433a	I feel that being an aging worker (above 50) negatively affects my job opportunities and career progression (Likert 1-7)	UESI questionnaire
		FC433b	I feel that being a young worker (less than 30) negatively affects my job opportunities and career progression	UESI questionnaire
	Working with vocational institutions to encourage female participation in relevant courses (w = 0)	FC434	My community/country offers role models advertising in careers where traditionally less gender balance is achieved (Likert 1-7)	UESI questionnaire

	4.4. HEALTH STATUS AND WELLBEING (w = 0.18297)	Personal protective equipment designed specifically for women (w = 0)	FC441	My company has provided me with equipment or uniforms or protective work-wear designed and suited for women (Likert 1-7)	UESI questionnaire
		Maintenance of wages and benefits during maternity (w = 0)	FC442	Does your company maintain your wage and benefits during maternity? (Yes/No)	UESI questionnaire
		Prevention of dismissal during maternity (w = 0)	FC443	Do you know any case of dismissal during maternity leave in your company? (Yes/No)	UESI questionnaire
		Leave for caring responsibilities (w = 0.03071)	FC444	% of women leaving for caring responsibilities (in the last 3 years)	Dataset (Propietary data)
	4.5. DEMOGRAPHIC (w = 0.20615)	Diversity training (ethnicity) (w = 0.02197)	FC451	In my workplace, belonging to an ethnic minority group affects my career progression and training (Likert 1-7)	UESI questionnaire
		There should be no discrimination in access to training, skills development and employment discrimination in the hiring and firing of women workers in their childbearing years (w = 0)	FC452	Do you think there is discrimination in access to training, skills development and employment for women in the childbearing years? (Likert 1-7)	UESI questionnaire

Table S5. K2 algorithm with K2 score code in Julia (adapted from [45])

```
// K2 procedure
function k2(DataObj,Order,u)
// Input: DataObj function in Julia. Contains all the information of the dataset, which included the
number of nodes n. Order is the given topological sort for network. And u is the max number of
parents for a given node.
// Output: For each node, a printout of the parents of the node.
// Copying the object to a new variable
LG = DataObj;
// number of variables in the dataset
Dim = LG.VarNumber;
// Initialization of the graph structure. Fully unconnected graph
DAG = zeros(Dim,Dim);
// Initialize the K2Score.
K2Score = zeros(1,Dim);
// Initialize a parent vector for a given node. The for loop means we are going to try a different
number of parents for the node. Ok is a helper function so that when we do not find a better score
we break out of the loop and move on
for p = 2:Dim
        parent = zeros(Dim,1);
        Ok = 1;
        P_old = -Inf; //the initiate state
while Ok == 1 && sum(parent) <= u  // sum of parents must be less than or equal to u since
u is our max number of parents for a given node
LocalMax = -Inf;      //   initial local max
LocalNode = 0;    // initial node
for q = (p-1):(-1):1  //  q is going to be a node from the topological sort to adjust
if parent[Order[q]] == 0  //  Parent of Order(q) looks if there is a parent for this node.
// Greedily add a parent to this node
        parent[Order[q]] = 1;
        temp_parent = reshape(parent,length(parent),)
        finder = reshape(findall(x -> x==1,temp_parent),1,length(findall(x ->
        x==1,temp_parent)));
// Calculate the G-function on this neighborhood operation to see if it improves our score
 LocalScore = GFunction(DataObj, Order[p],finder);
if LocalScore > LocalMax
        LocalMax = LocalScore;
        LocalNode = Order[q]
End
parent[Order[q]] = 0;
end
end
// Update our state to the new value
P_new = LocalMax;
        if P_new > P_old
```

```
            P_old = P_new;
// if the score is better, then update our parent to now have the child
 parent[LocalNode] = 1;
else
            Ok = 0;
end
end
K2Score[Order[p]] = P_old;
DAG[:,Order[p]] = parent;
end
// Obtaining Outputs: DAG and K2 score
return    DAG, K2Score
end
```