UBER Algorithms Analysis

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Abstract—Due to the development in the field of electronics and IT industry nowadays a Smartphone is available in almost everybody's hand. Alongside with the revolution in communication technology the data rates have gone substantially down. This has led to technological change and has given rise to the booming "gig" or "platform economy," but labour law has yet to catch up. Platform firms, most prominently Uber, use machine learning algorithms processing torrents of data to power Smartphone apps that promise efficiency, flexibility, and autonomy to users who both deliver and consume services. These tools give firms unprecedented information and power over their services, yet they are little-examined in legal scholarship, and case law has yet to meaningfully address them. The potential for exploitation of workers is immense, however the remedies available to workers who are harmed by algorithm design choices are as yet undeveloped.[1] Uber and Ola both are one of the fastest growing firms in the taxi aggregator industry. UBER services are available in numerous countries around the world. It solicits Drivers as driver partners and provides its customers ease of getting a ride. There is vast difference in what these platform economy based companies promise to their drivers and what they do. There are many fields to be looked upon ie Labour laws, worker rights, algorithmic control, employee or independent contractor, wages cut etc.

(0.5cm)In this report we will be focusing on the Ethical Issues pertaining to the algorithmic management of drivers by Uber. We will analyze a set of economic and psychological harms to workers uniquely enabled by algorithmic work platforms and explore common remedy, using Uber and its driver-partners as a case study. We will focus on the design and function of machine learning algorithms, highlighting the Uber application.

I. INTRODUCTION

The past decades have seen the rise of algorithmic management, the use of algorithms to allocate, manage, optimize, and evaluate workers across a wide range of industries. This trend, coupled with the widespread adoption of smartphones, has given rise to what has been variously termed the "gig economy," the "sharing" economy, the "on-demand economy," or the "platform economy" an ill-defined grouping meant to describe firms that facilitate peer-to-peer services via digital platform marketplaces. These include, most prominently, the transportation network companies Uber and Ola.[1] The taxi market in India was highly fragmented and unorganized, which consisted of individual car owners and small-scale agencies operating in different cities around the country.[3] Proprietary algorithms match workers to customers who summon them with the tap of a smartphone, promising a seamless, optimized transaction to users on both sides of the market. In return, the firm providing the platform marketplace collects a percentage of the cost of the service in addition to valuable user data.[1]

A. Gig Economy- Platform Economy

Gig Economy is a labour market characterized by the prevalence of short-term contracts or freelance work as opposed to permanent jobs.[4] Initially the term 'gig' was used for a group of magicians who used to perform. They were paid for the specific job (particular performance) they performed. Instead of regular office jobs short term jobs ad hoc short term engagements are preferred.
An increasing number of businesses are starting to adopt the platform business model and its digital strategies in order to remain competitive. The platform economy is a complex phenomenon that is significantly disrupting the general concept of 'normal jobs'. It is any type of digital platform that uses the internet to connect dispersed networks of individuals to facilitate digital interactions between people. Within the platform economy there is a triangular relationship between three parties: the platform, the worker and the customer. It is the job of the platform to connect people with demand (the customer) to people that provide supply (the worker).[5] In the case of Uber Machine learning algorithms with theoretically perfect information on the market and instructions to maximize profits will get better and better at matching buyer's sellers of services, and everybody wins.[1] The Uber application inflicts a range of potential economic harms to workers enabled specifically by the two-sided platform model resulting directly from the firm's design choices.

B. Uber Company

Uber Technologies, Inc., commonly known as Uber was set up in March 2009, San Francisco, California, United States by Garrett Camp and Travis Kalanick. Uber initially started as a private car service for executives but soon grew to become the highest valued private start-up company in the world. Now Uber is available in 65 countries and over 600 cities worldwide. Around 14 million Uber trips are completed each day and well over 10 billion trips have been completed worldwide (data as of 2018).[6] 2018 Uber revenue saw a 43% increase from 2017 to 2018 when financials amounted to $11.3 billion. Bookings were also up to 45% which brought the total to $50 billion. Uber drivers numbers are 3.9 million worldwide.[7] More or less Uber is a giant in the global ride

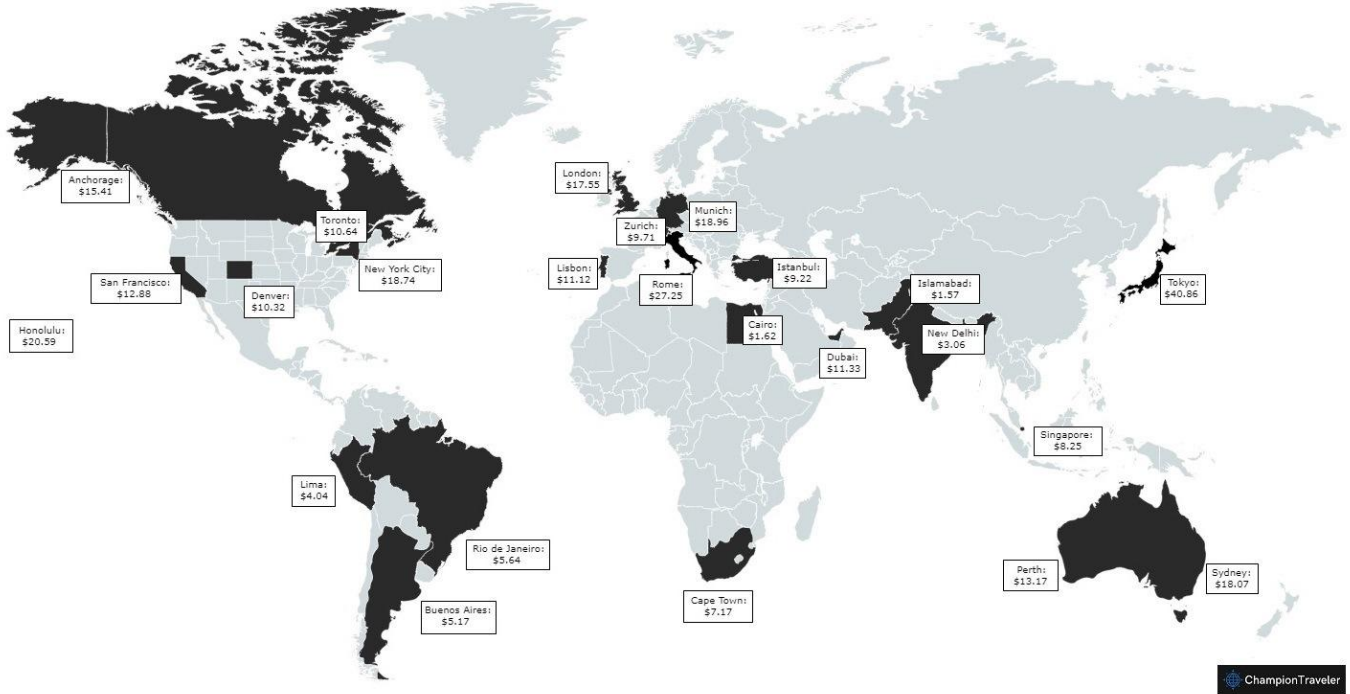The cost of a 10km (6.2 mile) Uber in different cities around the world

Fig. 1. Ubers across the world

hailing market and its company policies influence a substantial number of people around the world.

C. Who can directly benefit?

Companies are increasingly using algorithms to manage their remote workforces. Called "algorithmic management".[8] Following stakeholders can directly benefit from the platform provide by Uber.

   i. **Company (Uber)** Uber takes a cut for the platform it provides.
  ii. **Self-employed workers (Drivers)** Drivers earning improved manifold.
 iii. **Customers (Passengers)** Get a ride by tap i.e. convenience of getting a ride.

II. METHODOLOGY USED FOR STUDY

For this case study, we studied the various research papers(mentioned in References at the end) and newspapers dealing with Uber available open source on the web. We also performed archival and real-time analysis of posts by Uber drivers available open source on the Internet. To know the actual ground truth we interviewed various drivers across the city covering various experience levels and deliberated on the facts so found.Our conclusion and analysis is based on brainstorming within the project group as well as other fellow students of IIT-D.

III. LITERATURE REVIEW OF UBER ALGORITHM

A. How Uber makes money?

There are two primary ways Uber makes money – and these are pretty simple on the surface. One way is by charging their customer for rides. The second is through promotional offerings and partnerships involving third parties. Uber collaborates with vehicle owners and drivers and together they set up a minimum charge at which the partners will operate. Uber supplies them riders through online bookings from one single application and charges some amount of commission from them. The commission charged by the company ranges from 20% – 25% of the total amount charged from the customer. Uber sets the price of a ride as per kilometre charges and the time spent.[9]

The payment to be made by the client is systematized through an algorithmic procedure which takes into consideration the factors of time taken, distance traversed and fuel used. In fact, surge pricing also makes use of these algorithms. UberPool is a feature that allows users to share rides in case all seats are not booked by one user at a time. This saves the users money and the company fuel charges for transportation. Besides, it is a great endeavour for tackling heavy demand and the lesser number of available rides for busy locations.[9]

B. Benefit To Drivers

Benefits to drivers are as follows.

1) Higher Vehicle Utilisation: Drivers get a much organised business with sustainable income. That's the reason why the drivers work with Uber otherwise they are always free to leave.

2) Flexible Working Hours: Drivers can work as much or as little as they would like and during any hours. No need to schedule driving around other activities. They can drive when they have time.

3) Insurance: Uber provides commercial insurance that covers the vehicle from the time the trip starts to when it ends. Also included is uninsured motorist coverage along with other coverage including coverage when the driver is between trips.

4) Worry free cab Maintenance: Uber will help drivers with some expenses i.e. cleaning up vomit or other stains. However, the wear and tear on your car is an expense that falls on the driver.

5) Extra Income: Drivers earn extra income through Uber. They can be free to operate for competitors of Uber at other times. Opportunity for almost anyone to have a flexible way to earn income, assuming the driver has the temperament to run their own business.

C. Benefit To Customers

Customers benefit through Uber in following ways.

1) Convenience: Earlier times we used to wait for taxi and booking a taxi was a nightmare, especially during late hours or early morning. With the advent of online cab providers, nowadays a cab can book a ride in a matter of a few minutes. Getting a ride is just as easy as a tab on a smartphone. Uber app is easy and hassles free. The app is easy to sign up and simple to use. It gives you step by step instructions to follow so that you don't get confused.

2) Cheaper Rides: Uber is less expensive than traditional taxis and car services. Sometimes customers can also find coupons and deals on offer.[10]

3) Quality of Service: Uber provides consistently high-quality service as they provide training for the drivers and thus they are amazingly friendly and easy to work with.

4) Safety: The app makes Uber safer than taxis in many ways; drivers and riders can check ratings on each other, real-time GPS helps everyone locate each other, and digital bookings and payments limit robberies.[11]

5) Availability of ride: There's no refusal, unless in extreme cases when the driver can't make it to the location within time, or when there are no cars available.[9]

6) Flexible routes: The route could be altered as per the flexibility of the client.

D. Uber Business Model

Uber doesn't employ its drivers. It partners with them. Uber has argued several times how it is not a transportation company, rather a technology or service provider, according to sources. Drivers set their own work structure and hourly duration and are under nominal control. They have all rights to accept or reject the terms and conditions of the contract and can collaborate with Uber for a desired span of time. 13. A partner has a partnership account with Uber Technologies

Fig. 2.   How Uber works from a User point of view

where he adds his own vehicle/s with all the supporting documentation for that vehicle. He has to pass a background check. A partner has to set up a bank account where all the fares made every week are posted via direct deposit.

E. The Success of Uber Business Model

The Business Model of Uber is also profiting on several other levels. For instance, people hardly compare transportation applications on their smartphone before going for a ride. Hence, a single mobile application is accumulating several customers worldwide. Besides, the strong distribution network and the greater number of cars on the road provide better service to customers. The fares have an advantage too – and are pocket-friendly. Also, an Uber ride costs less than one in your personal car, with your personal driver.

F. How Uber algorithm works?

Uber Algorithm Optimizes a dispatch system using an AI simulation and a machine learning framework. Getting a ride from an Uber driver is beautiful in its simplicity.

  i. Simply open the app
 ii. Set the pickup location
iii. Request a car
iv. Get picked up
 v. Pay with the tap of a button

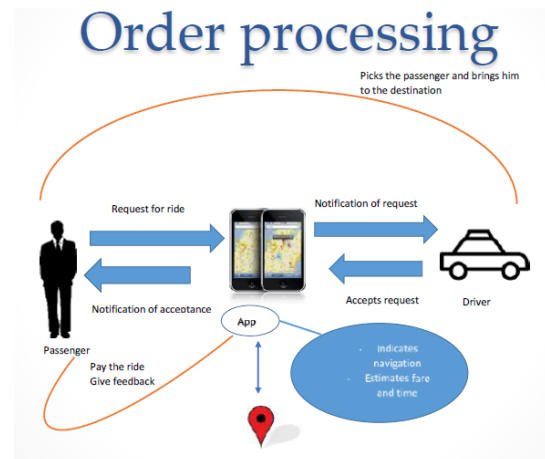Fig. 3.   Uber Order Processing

At its core, Uber as a software platform currently has two main goals.

i. On the rider's side, getting customers a ride when they need it.
ii. On the driver's side, maximize trips taken on the system, which maximizes our driver partners' earnings.
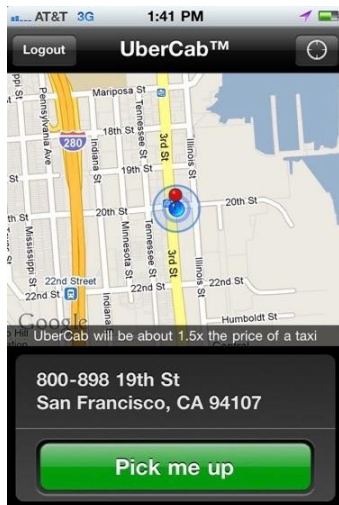

Fig. 4. Pick up location and request

Uber has a massive database of drivers, so as soon as you request a car, Uber's algorithm goes right to work in 15 seconds or less, it matches you with the driver closest to you. In the background Uber is storing data for every trip taken even when the driver has no passengers. All of this data is stored and leveraged to predict supply and demand, as well as setting fares. Uber also looks at how transportation is handled across cities and tries to adjust for bottlenecks and other common issues.

1) Data Visualization: Technical team at Uber has prepared ready to use sophisticated data visualisations. From these visualisations the high level employees can view the status of current rides, drivers get to know high demand areas, customers can follow the ride and see cab availability etc. Uber leverages data visualization to better understand how our cities move. Its solutions enable it to embed maps with rich location data, render millions of GPS points in the blink of an eye, and, most importantly, derive insights from them. Data visualization also helps the public better understand what Uber does and how it works, such as this visualization of how uberPOOL helps reduce traffic, a visualization that was shared during founder Travis Kalanick during his TED Talk.

2) Visualizing Data Analytics: All of the data is collected, crunched, analyzed and used to predict everything from the customer's wait time, to recommending where drivers should place themselves via heatmap in order to take advantage of the best fares and most passengers. All of these items are implemented in real-time for both drivers and passengers alike. Uber manages billions of GPS locations every minute, their platform juggles millions of events, develops mapping and

framework to data that the public (such as drivers) sees. Some of the visualizations are.

i. Surge pricing map
ii. Route maps
iii. Traffic map
iv. Distributions of Uber drop-offs

G. Current Scenario

Uber considers drivers as independent contractors or driver partners, thereby shedding the responsibility of an employer. There is no employee employer relationship and Uber strictly advocates that it is just a platform provider (a service company) to make the customers and the driver patterns meet.

Uber uses a proprietary machine learning algorithm that matches workers to customers (with the tap of a Smartphone), promising a seamless optimized transaction. Uber uses smartphone apps that promise efficiency and flexibility. The platform makes it possible to request transport services via a smartphone with the Uber app installed. The app detects the location of the user and finds the nearest available driver, who has entered into a contract with the company.

The Uber's Business model promises a lot of good and to a great deal do it also. That's why the company is surviving. As every driver partner is free to join and leave at will or work with the competitors of Uber. However, there are ethical issues pertaining to the algorithmic management by Uber that need to be looked into as the power and information available with the company is immense. Another aspect is the worker exploitation and the amount of control exercised by Uber.

Global ride-hailing app Uber said in a report that it has more than 50% market share in India, based on its internal gross bookings estimate. An Uber spokesperson said the company facilitated more than 14 million rides a week last year, compared to 11 million in 2018, as reported by technology news site TechCrunch.

Homegrown cab aggregator Ola, responding to ET's query on Sunday, said it had disclosed in regulatory filings for the year ended March 31, 2019 that it recorded 1.5 billion bookings on the platform, which roughly translates to over 28 million weekly bookings. [11]

The area expanse covered by Ola is a lot more than Uber as it is present in 110 cities however the assignment of jobs is not very optimal, also the advertisement reach of Ola is much less as compared to Uber. Ola has also several times been rated badly as the drivers take too long to reach the destinations and sometimes take a longer route than necessary.[12]

Economic times articles also mentions -The monthly income of drivers on Ola and Uber has taken a hit as these companies cut costs and reduce subsidies. The take-home pay for drivers dropped 33% in the last one year, according to data collected by research consultancy firm Red Seer.[13] I spoke to a driver who said his monthly income was around 90,000 during that time.[14]

Fig. 5. Distributions of Uber drop-offs as visualization by Uber

1) Uber major Rival in India: Ola Cabs (styled as OLA), is an Indian origin online transport network company developed by ANI Technologies Private. Ltd. By April 2017, the value of the Ola was $3 billion.

TABLE I

COMPARISON BETWEEN OLA AND UBER

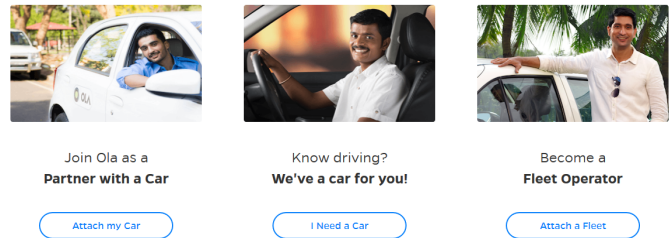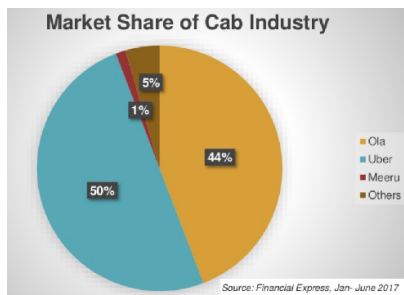| Basis	OLA	Uber
Lunch	2010	2009(2013 in India)
Valuation	3 billion $	62.5 billion $
Fundraising	1.75 billion $	11.56 billion $
Key investors	Softbank, Tiger global, DST	Benchmark, Baidu, Saudi Arabia's public investment fund
Tech platform	Application	Application
Presence in number of cities in India	110	29
Number of vehicles on the platform in India	5,50,000	3,50,000
Market share in India	Around 65%	Around 35%
Number of employees in India	8000+	200+

Fig. 6. Market share in Indian Cab industry

2) How to Join: There are basically three ways to join ride hailing companies. Join Ola as a partner with a Car(Attach my Car), join as a driver for cab company owned cars, Become a Fleet of cars Operator. More or less these three options are common for all ride hailing companies.Fig. 7.

Fig. 7. Different ways to join Cab Companies

3) Boost Price: Uber Boost is an incentive program for Uber drivers and is available globally. Boost is an incentive that multiplies driver's earnings for all trips within specified locations and specified times. These places and times are announced in advance, and it enables drivers to determine where and when they should be working. They are announced to drivers through communications they have selected (say text messages) or in the "Promotions" tab in the Driver's app. Boost multiplies the amount a driver earns for each trip. For example: if your Boost multiple is 2x, on a trip that would normally earn driver 100 Will earn 200 instead. Since both Boost and Surge multiply the amount you earn for each trip, we will always pay you the higher of the two.

4) Tipping: Tipping is optional. You are free to add a tip, and drivers are free to accept tips. At the end of the customer trip,the customer will be prompted to rate your driver. Once
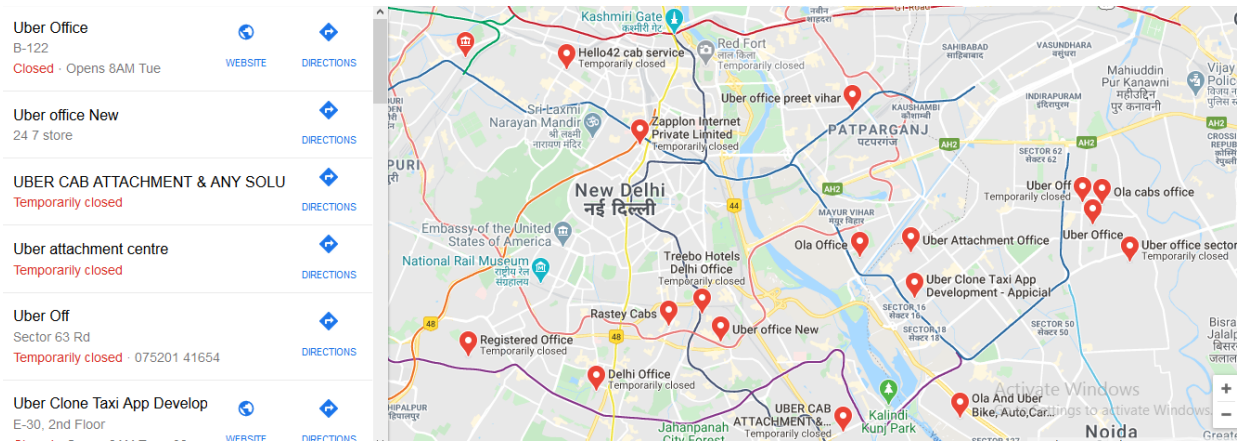
Fig. 8. OLA/Uber Cab Offices in Delhi NCR.(Google Map not to scale)

you provide a rating, the customer is given the option to add a tip. Giving cash directly to your driver is also an option. All of the tip goes to the driver and Uber takes zero fees on tips(as claimed by Uber).

5) Incentive Cutting: Uber and Ola together account for over 45,000 vehicles in India and together are being accused by their drivers of slashing incentives so they can increase margins and offer lower fares to users amid increased competition.Initially, earnings increased due to incentives and rates were high but this was just for market capture later slowly slowly incentives were reduced and nullified. Many drivers even.

"We would get incentives like a bonus of Rs 6,500 for completing 14 rides a day. That extra that we earned from setting goals for ourselves was encouraging and usually went directly to my savings," says Gupta. "Now we get offers like Rs 1,350 for completing 40 rides in 4 days, and even that doesn't happen. We're always asking each other, "Did you make any incentives today?" and the answer is always 'No'."[16]

6) Uber - Driving Salaries in India: The average Uber monthly salary ranges from approximately 15,500 per month for a Commercial Driver to 20,003 per month for a Delivery Driver. The people who are earning comparetively lesser they're switching their jobs to Ola and Uber.

 i. The average driver income per month across aggregators in Q1 2016 was 49,000 against 53,000 in Q4 2015, according to RedSeer.
 ii. Average salary 21,861 per month for OLa Cab drivers and Average salary 15,691 per month for Uber drivers in India. (https://www.indeed.co.in/. Salary estimated from 27 Ola drivers and 19 Uber drivers , users, and past and present job advertisements on Indeed in the past 36 months. Last updated: June, 2020).
 iii. Based on the latest interview it is found that drivers on an average earn about 32-40 (50-60 total earning per month before lockdown due to COVID-19 pandemic) which they consider good. But most of them complain the salary has reduced a lot gradually.

Fig. 9. Driver salary per month in India

As per https://www.indeed.co.in which is a online website shows the following statistics about cab drivers in India.

7) Number of hours of work per day: Cab Drivers work for 12-18 hours a day. Drivers try to maximize the running hours of vehicles by working in 2 continuous shifts during the day and then during night offer their vehicles to hired drivers.
"To make more than 90k a month, you have to work 20 hours a day, which means you can't go home, sleep properly or have a normal life" — Uber driver Abhijeet Singh

8) Lack of driver training and preparation: In order to become an Uber driver, there is a low bar to entry (be over 21 years old, pass a state and police background check, have 1 year of driving experience) (Uber.jobs n.d.).

H. Ethical Issues with Uber based on Literature Review

Uber calls its drivers "driver-partners," suggesting a joint profit-maximizing enterprise, But the partnership is not equal. As the all-seeing intermediary, Uber enjoys near-total control in determining not just individual offers of driving assignments, but the overall strategy and goals of the firm. Most crucially, Uber has sole knowledge of, and discretion over, the parameters, data inputs, and goals of its dispatch algorithm.

1) Surge Pricing: Surge pricing, a model nicknamed "Geo-surge" at Uber. Surge pricing is displayed to drivers through a type of heat map visualization, where the algorithmic assessment of supply and demand will temporarily raise fares for a particular geographic location. It is unreliable for drivers: Notably, pricing is based on the passenger's geolocation, not the driver's. Considered using machine-learning algorithms to predict where demand will be strong. In the short term, surge pricing substantially affects the rate of demand. However, long-term use could be the key to retaining or losing customers. Less than 10% of all trips" are affected by surge pricing, but surge (algorithmic) pricing recurs in driver discussions as a central preoccupation, and it remains a popular incentive: Screenshots of surge rates and zones are often posted to forums to display enthusiasm for a pay lottery.

The problem scenario contributing to ethics issues are as follows.

  i. Drivers travel to surge pricing zones in search of fares advertised at a given rate, but they can and do receive ride requests from passengers in other, adjacent areas where the prices are low.

  ii. A driver may enter a zone that is surging at 3.5, but receive ride requests at a lower surge rate, such as 1.5.

  iii. Many times passengers try to manipulate the system wherein they place the pickup pin just outside the surge location and on phone they guide the driver to the actual location.

  iv. Driver moves from place A to B looking for higher surge prices but when he reaches the surge is gone and normal rate applies. The cost of travel is from the driver's pocket.

Generating Surge Price Areas Through surge pricing's appeal to the concept of algorithms and automated management, Uber can generate and coordinate clusters of labor in response to dynamic market conditions (Aneesh, 2009, p. 356) without explaining the reliability of its cluster incentives or guaranteeing the validity, accuracy, or error rates of its labor deployments. Many drivers express frustration and enthusiasm alike for surge pricing because its very dynamism is characteristically fickle and opaque, a finding supported by Lee et al. (2015, p. 1609).

Surge Pricing Backlash Uber uses an automated algorithm to increase prices based on supply and demand in the market. On New Year's Eve 2011, prices soared to as much as seven times standard rates, fueling negative feedback from users. Surge pricing triggered outrage again during a snowstorm in New York in December 2013. More recently Uber committed

Fig. 10. Sample surge map. Red means that demand is surging, orange indicates that rising demand, and yellow shows moderate demand.

to capping surge pricing during several blizzards in New York City.

2) What Uber Promises Drivers?: Uber promises Drivers "flexible employment", be your own boss etc. However, Uber completely dominates when it comes to Power Balance. Uber advertises to drivers that, "With Uber, you have total control. Work where you want, when you want, and set your own schedule" and "Freedom pays weekly."However, Drivers as they are considered "Driver Partners" or "Independent contractors" have very little say in the company's decision making. They more or less work as skilled labourers for the company. Drivers are not free to choose their rides or cancel the rides as it affects their driver ratings. Drivers are paid per ride only.
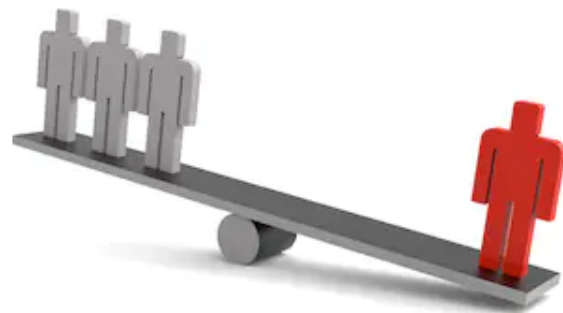
Fig. 11. Power balance in GIG economy like Uber is heavily in favour or company

3) Information and Power Imbalance: Companies are almighty, its platforms can take extraordinary measures without their consent of the drivers or other stakeholders. The power imbalance is quite clear Uber can hold drivers accountable to the "most efficient" routes, but drivers need their own data to hold Uber accountable for the wages they are owed.Most notable are the combination of blind passenger

acceptance with low minimum fares and the algorithmic determination of surge pricing. These two features of the Uber system reveal, respectively, how little control Uber drivers have over critical aspects of their work and how much control Uber has over the labor of its users (drivers).

Uber also gathers data on its drivers. In addition to collecting non-identifiable information about their vehicle and their location, Uber also monitors their speed and acceleration, and checks to see if they are working for a competing company as well.

4) Nudging by Uber: Surge pricing thus exists as one example of Uber's institutionalized nudging of the driver workplace as a method for leveraging "soft control" over driver behavior, which also includes heat maps, incentives, and frequent messaging. Frequent nudges are a highly visible part of the "choice architecture" (Sunstein, 2014, p. 2) of the Uber system: Uber can steer drivers to work at particular places at particular times while maintaining that its system merely reflects demand to drivers, who have full freedom of choice to ignore Uber's authoritative nudges. If drivers are mere "consumers" of a lead-generation application, then nudging is just another form of informational advertising, but nudging that comes from an employer has a stronger managerial element of control.

Messages urging drivers to stay online, or to go online, imply or state explicitly that it will surge because there is high demand are often posted to forums. A sample push notification that drivers receive reads, "Are you sure you want to go offline? Demand is very high in your area. Make more money, don't stop now!" with the surge icon displayed above the message. Drivers' responses range from skepticism of exaggerated demand to an enduring willingness to continue, sometimes despite significant fatigue. Thus Uber constantly keeps nudging the drivers to make them available for jobs. Uber has no concern about the drivers fatigue level, in fact the algorithm plays on the human psychology of a driver ie. the urge to earn a bit extra. This keeps the driver on road for a longer time many a time 18 hrs continuously.

5) Steers its Drivers: Uber influences the drivers Decision making process by playing on the minds of drivers. Uber algorithm moto is to make maximum profit for the company, this will only happen if its drivers are deployed on different sections of the city depending on demand. To achieve this objective Uber algorithm constantly nudges and makes the drivers move to the required position of max profit(surge areas). When a ride is allotted the driver is required to follow the designated route on the map and cannot deviate. Eventually the route and the location of the drivers are indirectly controlled by Uber.

In an article the USA TODAY highlights that Some Uber drivers work dangerously long shifts. For an instance, instead of the 8 USD per hour average he had been making, the 48-year-old Provo, Utah resident says that day, rates jumped to 20 USD per hour for no apparent reason. To take advantage of it, he drove for 20 hours straight.

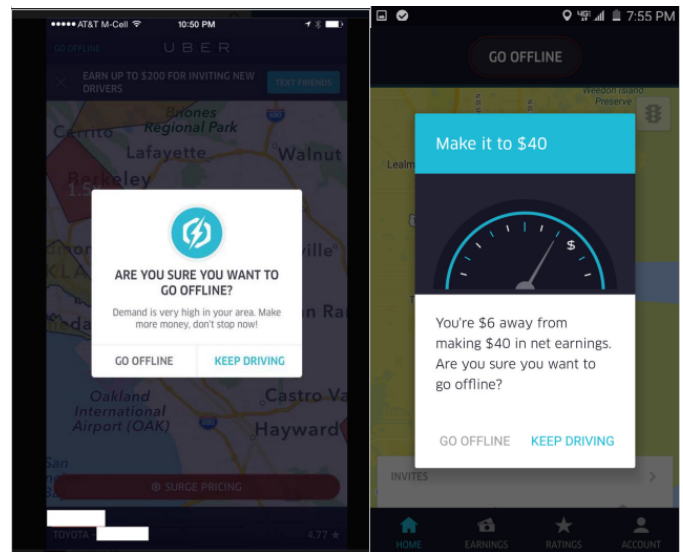"I felt trapped," Lindsey said in explaining his dangerously

Fig. 12. Various forms of Nudging by Uber

long shift. "I thought, 'I might never see it this good again.'"[15]

6) Little Transparency: Uber has the power dynamic in its favour when it comes to handling information. When active Uber drivers receive a ride request through the system, they have about 15 seconds to accept it or reject it. When Uber drivers accept a ride request, they take on the risk that the ride's fare will not be profitable; yet, drivers are not shown destination or fare information before they accept a ride. Blind Passenger Acceptance One driver complains "You're driving around blind. When it does ping, you might drive 15 minutes to drive someone half a mile. There's no money in it at that point, especially in my SUV." Drivers say if we are free to choose our ride, let us know the destination beforehand and drivers should not be penalised for rejecting the ride. The practices of blind rider acceptance and minimum fares are two manifestations of the larger fact that Uber has full power to control and change the base rates its drivers charge. Uber's agreement with its "partners" (drivers) permits drivers to negotiate a lower fare, but not a higher one. Fare Cheating Uber keeps bumping around with the rates and the different terms of service. Drivers log in and all of a sudden there's new terms and conditions and they can't drive until they accept the new terms and conditions and if on your phone they have to really look and try to read everything.

7) Hourly wages Guarantee to Some Drivers: Uber sets low rates for routine work, incentive-based pay steers drivers into working under much stricter and less flexible conditions in the hopes of higher earnings, such as hourly wage guarantees which vary according to the terms of each guarantee. Uber does not disclose the criteria by which certain drivers are selected for hourly guarantees, but Uber Support CSRs explain, "Some guarantees are only offered to a specific group of partners. We rotate these guarantees to make the guarantee structure as fair as possible." The narrative of freedom and

choice that Uber promotes to its drivers, while simultaneously masking a hierarchy in which select drivers are invited to earn more based on opaque criteria.

8) Driver Ratings: The information that Uber discloses to drivers about their past behavior has the potential to influence their future behavior. In the driver rating system offered to riders, passengers are empowered to act as middle managers over drivers, whose ratings directly impact their employment eligibility. Drivers need to maintain a rating of around 4.6/5 to remain active on the app, although this requirement can vary by city. Passengers rate drivers on a scale of one to five stars, and drivers' ratings are averaged to reflect their last 500 rated trips, although some drivers receive deactivation notices if their previous 25 or 50 trips receive low ratings.To achieve good ratings, drivers must modify their behavior to produce a homogenous Uber experience for riders.

9) Weakly Performance Matrix: Instead of imposing disciplinary measures on drivers, Uber controls how drivers behave through weekly performance metrics. Individualized metrics also foster a "highly individualized sense of responsibility for one's own job stability" (Neff, 2012, p. 28), even though drivers have limited control over how passengers interact with the rating system or how Uber assesses it. If the ratings are low then the drivers can be put off the job.

Fig. 13. Weekly performance matrix

10) Constant Surveillance: Each and every move of the drivers when on job is monitored and ratings keep tight grip on the behaviour of drivers.Passengers and Uber have the ability to watch drivers as they approach, surveillance their route, and even have the ability to track them after they have departed.The passenger app extends their role as "the watcher" (a stand-in for a traditional manager; Fuller & Smith, 1991; Stark &

Levy, 2015).This surveillance part is even without consent of drivers, many a times drivers don't have any choice but just to accept the T&C before taking a ride. This surveillance affects the drivers behaviour and talours it to be a constant. This way drivers have to be someone else in the same skin with modified behaviour.

11) Fired by an Algorithm: Driver risks deactivation even if the ratings have been wrongly given to them. They have very little say and based on the ratings they can be temporarily deactivated(Off-road in Indian context).

In order to move to the next state, a driver has to satisfy both conditions on average ratings for the last 50 and 500 trips and the condition for the number of trips. At each one of the steps the driver gets a notification by email, by text messaging, and through the Uber app. The notification explains that they are getting closer to deactivation and provides links to resources with help to improve ratings.This is the rating that drivers can observe in their app and which is shown to users when they are matched to a driver.

TABLE II
Deactivation process for UberX [17]

Event	Last 500 rating	Last 50 rating	Rated trips
Notfication 1	<4.6	<4.6	25 since first trip
Notfication 2	<4.5	<4.5	25 since notfication 1
Temporary deactivation	<4.4	<4.4	25 since notfication 2
Reactivation	Passed quality improvement		
Notfication 3	<4.4	<4.4	25 since reactivation
Permanent deactivation	<4.4	<4.4	25 since notfication 3

Table II shows the percentage of drivers that are at risk of falling below each one of these thresholds. It shows how many 3 star rated trips the driver would have to complete in order to fall below each threshold. We see that only a very small number of drivers are likely to eventually reach the 4.4 threshold for deactivation. On the other hand, a somewhat more important fraction of drivers are close and even below the 4.6 threshold for the first notification. This means that if this deactivation process has an effect on driving behavior it is most likely through behavioral nudges instead of through actual incentives a fully rational agent would react to.

12) Customers as Managers: As there are no formal managers to oversee the quality of individual drivers' job performance, Uber's system recruits passengers to perform a type of managerial assessment through driver ratings. The automation of many managerial functions in the Uber system does not obviate the drivers' need for an Uber representative who is empowered to mediate their concerns in ways that CSRs cannot. Although rating systems can be billed as a way to build and scale trust and accountability in platforms, they have other impacts on employment opportunities. Uber keeps

monitoring and informing the drivers what is expected out of them.

Customer Education Customers rate drivers and have their own perception. A customer might think giving 4 out of 5 is very good. However, Uber interprets it differently and 4 is low for drivers. So customers need to be educated about it. Most of the time it is up to drivers to educate customers and request them for higher ratings.

CSR Robots In case something goes wrong ie some passenger has given a low rating and the driver wants to explain. He can only interact only with CSR (Community Support Representatives). At the end of CSR there will mostly be a computer or even if there is a human the response is always a template response. Due to this many times drivers refer to these CSR as CSR robots. Which are heartless to understand the emotions of a human. Till a human is driving the vehicle they should be handled or managed by a human who can better understand their needs and feelings.

IV. FIELD SURVEY

The battle for dominance in India's ride-hailing business has restarted, with rivals Uber and Ola both claiming they control majority market share. In assignment of jobs Ola is not very well optimized as according to the data collected. Upon survey, it was found out that Ola cab is not as readily and conveniently available. This is mainly because Ola provides a wide coverage area. However, the availability is not compatible with demand.

A. Interviews of Cab Drivers

We had interviewed Cab drivers from various points of National Capital Region (near IIT-D gate, noida sec 28, Indira Gandhi international Airport - T2 taxi stand, further plan included visiting Taxi stands of different Railway Stations but had to be dropped due to Covid-19 Pandemic). We visited different places in NCR to interview drivers. With a preformed questionnaire we wanted to assess the difficulties faced by the Uber drivers. We also welcomed new thoughts and topics that had impact on drivers earnings or mental state. We had interviewed 28 drivers all together, this figure is comparatively less than we would have desired(due to pandemic further interviews could not be continued at same pace) but more or less the problems faced would be similar, as we had noticed that several problems were same from driver to driver.

Following is the link to the interview videos:
https://drive.google.com/drive/folders/
1E3zhHDaDe7OmprFep0v4DcNFC27I1Klx?usp=sharing

B. Survey: Algorithmic Control Issues In India

1) Experience of Drivers: Drivers had vast experience from 2 to 10 years. They were of different age groups and had different priorities when their families are considered.

2) Company You work for : Drivers wanted to get the max earnings and they had to repay their loans.So most of them worked for both Ola and Uber.

TABLE III
QUESTIONS TO OLA/UBER DRIVERS

S No.	Questions
1.	Company you work for?
2.	What is your per month current income?
3.	What was your per month previous income?
4.	Does it meet your expectations?
5.	For how many hours you drive?
6.	Any leave or weekly off-days?
7.	Are you and your family happy with your job?
8.	Do you have any minimum or maximum limits on rides? if yes, how many?
9.	What are the implications of lesser number of rides?
10.	Before you accept a ride, do you know the source and destination of a passenger?
11.	Driver Rating: i. What's your driver rating? ii. Are you satisfied with the ratings given by a passenger? iii. What are the implications of low ratings?
12.	Is your performance measured weekly or monthly?
13.	Can you deny a ride? If yes, any implications? i. Monetory ii. Performance rating
14.	Any difficulty finding a passenger? i. Surge price zones ii. Passengers misleading pickup points
15.	Does surge pricing benefits you more or the company?
16.	Is surge pricing predictions reliable (heat maps)?
17.	Does your company force you to drive more and do you get any incentives for extra driving?
18.	Does your company ask you to be available on a particular site?
19.	Are your complaints heard promptly, and how?
20.	Which one is your preference Ola or Uber and why?
21.	Any suggestions or complaints?

3) Average Monthly Income: Drivers were not able to give a clear estimate due to its fluctuating nature. However, they mentioned their average monthly income to be around 15000-26000.(https://www.indeed.co.in/salaries/driver-Salaries also shares same similar data) They mentioned that "before 2012 the income was quite high, those who worked had earned a lot".

4) No more Incentives : Drivers complaint that initially the incentives were very high, but gradually it reduced and nowadays they hardly get incentives. After market capture the incentives have vanished and lowered their income.(Hindustan times article[16] also refers the same included in literature review under current scenario)

5) Boost Pricing: The boost and the surge pricing concepts are different. In boost, the drivers an directly benefited and in surge pricing the company and drivers both are benefited.

i. Boost is applicable during night hours(evening 6pm to morning 5am) near IGI airport area.Unlike surge pricing, which is engaged on a temporary basis, Boost lasts longer (usually) and stays enabled for the duration it was announced.

ii. If surge pricing is also available, the driver receives the higher multiplier of the two. In boost drivers are benefited and in surge pricing Uber is more benefited.

6) *In-app tips on Uber:* " *Off late during this COVID 19 pandemic, Uber takes 30 extra from each customer as a tip for drivers,most of the customers also do not mind much as the amount is small. Uber encourages tips via app and not direct cash payment to drivers. Now since the tip is already cut the customer does not tip again.Tip is intended to benefit the driver and the whole amount should go to the driver. However, little to no money is contributed to drivers.*"

7) *Uber Managers:* Of late Uber has put some people in office as office staff managers.There are no exclusive managers to manage drivers. Drivers complaints are heard by these office staff managers. Mostly judgement goes in customers favour but still they are better than emotionless "CSR Robots".This is contradictory to Alex Rosenblat article (Algorithmic Labor and Information Asymmetries: A Case Study of Uber's Drivers, 2016) where in drivers complain of no managers. In India specially in Delhi NCR the situation is bit better at least the drivers have some people to complain to.

8) *Company Support to Drivers:* During the initial lockdown phase Uber gave its driver a on time grant of 3000(verified from multiple drivers). Further other drivers also said to some drivers a small loan amount (about 3000-5000) was given which they had to repay at 500 per week. The drivers were happy with at least some help they received from the company.

9) *Company Owned Vehicles:* These ride hailing cab companies also own some vehicles for which driver partners (some set of drivers) are allowed to drive. For these vehicles the initial 1200 per day are deducted by the company from earnings. Amount above the initial cut goes to driver as per standard rates(includes Ubers cut per ride).

10) *Lack of driver training and preparation:* There is a dire lack of training. The driver's own vehicles are not held to any reliable standard, the driver's own insurance, and the condition of the vehicle itself varies vastly.Considering the diverse range of people a ride share driver may encounter at any given point, there is relatively little training and preparation to become an Uber driver.

11) *Ola vs Uber Drivers choice:* Many drivers work for both companies to extract maximum benefits. More or less both companies follow a similar business model. But when it comes to comparing both companies, drivers have different views depending up on their personal priorities. In India, Ola has more drivers associated with it as the trust on company and satisfaction level in drivers is more for Ola. Initially market share of OLa was above 80% as in 2014 but slowly market share crashed below 50% in 2019 and Uber gained greater than 50% market share.

  i. Ola has a 24/7 Call center available for Safety of the Passengers. Helps to book cabs via a phone call.
 ii. It also has emergency services such as an accident that can be reported. whereas Uber has no call center available to

reach out to immediately. Ola is more supportive towards drivers.
iii. Initially Ola was unrivaled in India but slowly Uber started market capture by giving lucrative offers (incentives) to driver partners. Now both the companies are at par with each other minus the incentives to drivers.
iv. Drivers also feel that these companies have organised their works and now they get more rides which amount to more earnings.

V. SURVEY FINDINGS

During a survey conducted by us following ethical issues and scenario come out based on various questionnaire.

A. Have your earning increased?

77% of the drivers were happy that their earnings have increased, 15% said it is more or less the same as the earnings increased with increase in working hours, so per hour practically they are earning is less than before but due to more working hours their earnings overall have increased. 8% drivers did not have clear idea so they refused to comment on it.
Deliberations:- Overall, the earnings of the drivers have increased with increase in the no of working hours. Their job is now better organized and they are getting higher vehicle utilization.

B. Are you happy with the company policies?

70% of drivers were not happy with the company policy. Whereas 12% were happy, and 18% were not clear.

Happy About Company Policy
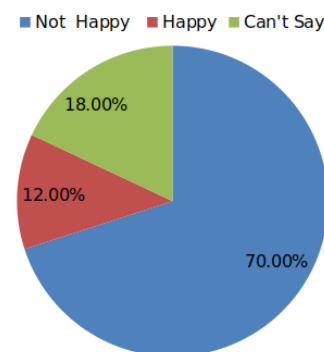
■ Not Happy ■ Happy ■ Can't Say

18.00%
12.00%
70.00%

Fig. 14. Company policies satisfaction

Deliberations:- Drivers are not happy with company policy due to its varying nature and lack of clarity. It is found that the education and understanding of the drivers are very limited , due to which they are exploited. It is Unethical on companies part that their drivers are not explained the company policies and drivers are exploited due to that. Alex Rosenblat in his study on Uber also mentions about companies varying policy and information Asymmetry.

C. Does Uber/Ola exercise soft control. If yes, then how?

72% of drivers agree that cab companies exercise soft control, and 28% had no Idea or are not aware. Companies exercise soft control through nudging via repetitive messaging which are lucrative in nature, these messages are sent when drivers try to go offline when rush(demand) is high, but more or less they can expect these messages any time of day. The Idea of these messages is to keep drivers available most of time for duty. Alex Rosenblat in his Algorithmic Labor and Information Asymmetries: A Case Study of Uber's Drivers, 2016 also mentions similar case in USA.
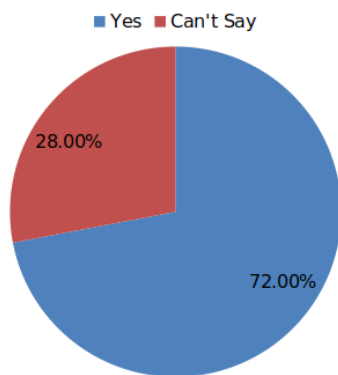
Soft Control By Company

Fig. 15. Soft control by company

Deliberations:- Movement of each and every driver on the road is monitored via the smartphone application. Uber and Ola both exercise soft control on their drivers via numerous lucrative text messages and make them work more at the companies' choice of place. It is highly unethical for companies part to exercise soft control on drivers just to keep their profits high.

D. Have your working hours increased in comparison to your previous job?

92% of drivers have agreed their working has increased. 8% of drivers said it depends on them how much time they work.

Deliberations:- Sole aim of the drivers is to increase their income. This greed is exploited by the company to make them stay on the job for longer time. Very less importance is given to driver's health and safety aspects. This highly unethical on the company's part to prologue the drivers working hours. This increases the frustration in drivers and lowers the safety aspects of the trip.

E. Does this company meet your expectations?

42% said yes and 58% say no. Initially, the income was high and gradually it has reduced. Though, many drivers think that the income is still better when they compare it with freelance drivers. Many drivers have left their jobs due to dissatisfaction. **Deliberations:-** Initially the companies per Km rate to drivers
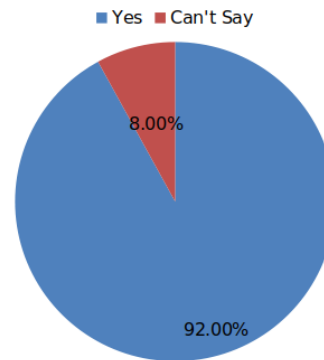
Increase In Working Hours

Fig. 16. Impact on working hours

was high up to Rs 14 but now it has come down to as low as Rs 6-7 per km, drivers had tried to protest against it but with very little success as the company is all-mighty and there is no participation of workers in shaping the company policies.(Prachi Salve Shreehari Paliath, IndiaSpend.com also mentions of reducing of incentive and varying nature of company policy)

F. Do you want to work for some other company or as a freelance driver?

58% of drivers are working for both Ola and Uber, 27% are working for either ola or Uber and 15% work as freelance drivers or for other companies. Initially market share of Ola was very high but Uber gave more lucrative offers to the drivers in the form of incentives but aftermarket capture the incentives perished.
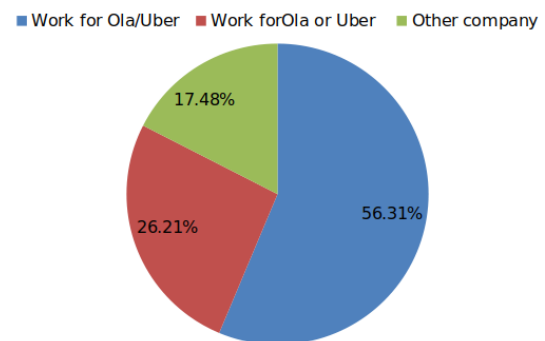
Worker Profile

Fig. 17. Working for more than one company

Deliberations:- Drivers want to work as employees for the companies and want to have a stable job; if given opportunity they will like to make a switch. It is unethical on the company's part to remotely control the lives of drivers and not considering them as employees.

G. Do you face any discrimination in Uber or Ola?

77% drivers said Company drivers are given preference to accept the rides. How to rest drivers are allocated rides the process is not clear. Many drivers are given more rides as compared to others, the reason for this discrimination is not clear to drivers.

Deliberations:- Company favors its drivers which are on its payroll. The job distribution is not fair this creates dissatisfaction among other drivers. The company should make the job allocation policy more transparent and educate drivers about it. This will keep the motivation of the drivers high.ALex Rosenblat also mentions same about information asymmetry and varying company policy in his study on Uber.

H. Do you get all money which is promised to you by the company or you experience any wage theft?

77% of drivers are of the opinion that they are paid what the charges are displayed at the end of the trip. Drivers are not aware how the rates are varied dynamically, especially how the surge pricing, companies cut are varied. Off late Uber takes Rs 30 as a tip from customers almost all drivers say this tip has never reached them, which is ethically wrong. In "A Case Study of Uber's Drivers, 2016" Alex Rosenblat mentions of wage thefts by Uber which is similar in nature.

Deliberations:- It is ethically wrong on the company's part not to forward the received tip to respective drivers. They need to educate drivers how this money is being used directly or indirectly for benefits of drivers, this is surely causing distrust in drivers and they feel cheated.

I. Is there any incentive policy in the company that makes you earn more?

92% of drivers said there is an incentive policy in company which has drastically reduced over years, 8% drivers were not aware. Driver's complaint that initially around 2012 incentives were very high which made their earnings very high. Due to these lucrative earnings many drivers left their previous jobs and joined Ola/ Uber but gradually the incentives reduced and non it is very little to nil incentives.

Deliberations:- Drivers express sorrow and distrusts due to the varying nature of the company policy. They feel even drivers should be part of the company's decision making and planning. This is only possible through collectives and cooperative or some form of driver unions, but as the drivers are not considered as employees they cannot have trade unions recognized by the government.

J. Drivers were asked if their problems, complaints are heard and resolved?

85% of drivers said that their complaints are not heard or acted upon. They feel that company highly favors the customers over drivers even if customers are wrong to some extent. However, 12% drivers said they are satisfied with the company, company offices of Ola and Uber are spread across Delhi and NCR and if they face any major problem they can get it resolved there. 3% drivers had no clue about this as

they were new in this field. Alex Rosenblat in his study on Uber drivers finds that driver complaints are not heard and no managers to hear them. In India situation is slightly improved as offices of Cab companies are more approachable.

Deliberations:- Drivers are penalized for false complaints by the customers. Whenever there is a serious complaint against a driver, his service is immediately suspended pending further investigation, and during that time, his earnings take a hit. To clarify such issues drivers have to go to the company offices and explain their side. Most of the time decision goes in favor of customers but if driver is able to clarify then his pay and work are restored. In India cabs don't have front and dashboard cameras, so it becomes difficult to judge who is right driver or customer. Uber and Ola have taken note of this and are trying to find remedies how to resolve these issues. In India unlike other countries the drivers get to interact with office staff at company offices. It can be said that their problems are heard to some extent.

VI. CONCLUSION

Algorithmic management is going to play an important and a major role in shaping the economies of countries. For something to survive in this world it has to be fittest (good enough) as perceived by humans, otherwise it will be replaced by its better competitors. App based algorithmic management though has many flaws when it comes to considering its impact on humans, but it is gaining popularity due to its reach and job creation aspects.

In literature review pertaining to our study it is found that, drivers exploitation is immense due to the information asymmetry in the favour of company. Company virtually controls every move of the driver via live location feature of the app. Drivers are lure to different places based on surge and boot pricing which are regulated to some extent by the cab companies via virtual demand hike. Drivers also complain of wage theft, as they do not receive full payment, what is shown on app initially and even the companies cut keeps varying. The drivers are constantly nudged by the company to be on road and on-duty. The company policy is not very clear to its workforce, which is intentionally done to gain information superiority. The customers as middle level managers are intended to keep a quality check on driver but often these driver ratings are miss-leading. Based on these driver ratings the driver can be fired automatically by the algorithm and driver has to put in lot off effort to regain his/her job.

As per the survey we found that, Indian market is different than that of the world.Though, there is a similarity in the Algorithmic management by the cab companies, but they have adjusted their policies in some cases to suit the market. In India drivers also face information asymmetry, wage theft and nudging by company similar to western world. In India driver's education level is less as compared to USA and western countries, drivers are not clear about the company policy and don't know how to put forward their problems and issues. However, there are company offices with office staff at different locations which are approachable for drivers. Drivers

are more satisfied when they are compared with western world drivers. Here they are not aware and not even question that they should be considered as employees.

Uber did not follow participatory design principles in its App or business model. This caused multiple grey areas, which result in a driver's dissatisfaction. This seems to be done purposefully to support the companies' high profit-making policies but surely has neglected its drivers and treat them as humanoids. This is highly unethical, and in UK now drivers have been given a chance to view the algorithm, and this move will surely bring change in how the gig economy shapes up in the future.

Government has to work as a watchdog as these concepts are novel and growing. The labour laws are yet to catch up with the pace at which the gig economy is expanding. Eventually a judicial aspect is to be given its due importance when it comes to workforce management through algorithms and checks and balances have to be placed to make them ethical.

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