ISSN 2385-2755
DiSSE Working papers
[online]

SAPIENZA
UNIVERSITÀ DI ROMA

WORKING PAPERS SERIES
DIPARTIMENTO DI SCIENZE SOCIALI ED ECONOMICHE

Genesis, Function, and Features of Lean Digital Platforms

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N. 8/2024

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CF80209930587 – P.IVA 02133771002

Genesis, Function, and Features of Lean Digital Platforms

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Abstract

Through analysis of the international significant literature this paper studies the nature, genesis and main characteristics of a new capitalism and business model that came to light in the early 2000s, and fundamentally after the 2008 financial crisis. This new business model is defined digital Platform economy. The aim of this paper is defining what a digital Platform is and when, according to the literature, a complex system of software and hardware components, big data, machine learning present on the web can be defined as a digital platform. The paper will also examine the main features of a Platform, a classification and a description of the role performed by the algorithms. Finally, the paper looks at the mechanisms and organizational forms of algorithmic management through concrete examples of work performance in lean platforms in the food delivery sector.

What a digital Platform is?

Starting in the beginning-2000s, during the second digital revolution, the affirmation of the digital organization of production began to make stronger the process of outsourcing and the contingency of patterns of capitalism business (Manyika, Chui 2013). In those years there is a radicalization of digital technologies and lean principles interconnected stronger what is usually called digital *lean production* which can be a powerful combination of timeless lean principles and evolving digital technologies to reduction surplus and irregularity in production procedures (Garibaldo, Rinaldini, 2022 - Jones, Womack 1990). Subcontracting, value chains, the coordination of subordinate companies are different management strategies with the aim of breaking up the workplace (Weil, 2017). These trends are remaking the division of labor and of the production between that must be done within the boundaries of the company and what can be allocated out. All operations that are not at the core of the company's profitability can be outsourced (Srnicek, 2017). Thus, while the first phase of mechanization pushed industrial mechanization to its pinnacle, creating industrial conglomerates and factories concentrating multitudes of workforce, in the industrialized world, the post Fordism model is generating a deep change, giving to firms a new perspective free of geographic constraints[1] (Frey, Osborne, 2015- De Stefano, 2016). A new business organization that moves away from the centralization of the means of production, physical and material, and utilizes a workforce anywhere, anytime (Frey, Osborne, 2013- Butollo, Luthji, 2017). With the evolution of algorithmic technology, an economy of sharing goods and services has developed and has made it possible to extract value from information, knowledge, and human intellectual activities, before in the traditional firms (Alquati, 1975) then directly in the physical and virtual social spaces with the big data mining[2] (Srnicek, 2017). In this scenario is embedded the source of the business model called *digital Platform.* But what is a digitized work platform really? What kind of action determines the creation and extraction of value from the control and takeover of virtual space? The term 'platform' is, indeed, everywhere, but it is unclear whether it is an ordinary indication or a real organization, a new condition in the digital age for

[1] For instance, digital platforms constitute a deepening of the process of breaking down the space-time barriers that regulate (and govern) economic, productive, and communicative relations. A process that accelerated towards the end of the 1970s with the rise of the ICT technological paradigm and the international fragmentation of production embedded in the capitalism culture lean.

[2] In the expression Big Data, the magnitude evoked by the term big has at least two meanings, referring not only to the quantity of data processed but also to the extraordinarily deep scope and granularity of the analyses that can be performed on them. To concretize the concept of big data, some scholars use the concept of the three V corresponding respectively to the three dimensions of 'volume',' velocity' and 'variety'. The volume that characterizes Big Data is that of data sets so large that they cannot be managed and analyzed with 'traditional' methods (spreadsheets, relational databases), but only with more advanced tools designed ad hoc. The concept of variety refers to the fact that data come from different sources and have different formats. With the concept of speed, finally, one evokes the rapidity of information transfer and the possibility to analyze it in real time. Big Data analysis techniques are applied not only to data sets hosted in huge archives but also to data 'in motion', at the very moment they are produced or recorded. Gartner IT glossary http://www.gartner.com/it-glossary/big-data)

organization of the production of means and service or a semantic camouflage of a natural evolution of post Taylorism capitalism business. Indeed, when software platforms were contained behind personal computer screens and locked into physical infrastructure, this phenomenon seemed not dangerous. But now that the digital production and distribution of goods and services linked meatspace and cyberspace, the analysis certainly becomes more composite. So, to understand the value of a *Platform*, it is appropriate first to describe the dynamics with which this business model has developed. If we analyze the process of the creation of one of the first digital platforms, *Amazon Mechanical Turk*, we observe how this production model initially grown within the confines of an enterprise deeply characterized by a *Lean production culture*[3] and then with the advancement of algorithmic moved out there, through the open spaces offered by cloud computing[4] (Callison, Dredze, 2010 - Onetto, 2014). The AMTurk program was originally formulated as a process for allocating specific tasks to internal independence production units inside the company. In connection with the company's task automation processes, critical issues have been encountered in completing relatively simple tasks that were difficult for a computer to perform. It was therefore decided to develop software that required internal employees to perform tasks, in this case it was the digital machine that distributed and ordered the tasks for the workforce production units. With the development of more efficient software and algorithmics, in 2005, Amazon made a substantial stage, realizing that the division-of-work program worked more efficiently the more the number of tasks to be distributed improved. Amazon decided, therefore, to make it openly available in the web. By outsourcing parts of the production cycle not inside or to other firms but to an unknown crowd of users of the web[5]. Thus, Mechanical Turk was born, called like an eighteenth-century chess robot, which had a man inside, an *artificial intelligence artificial* [6]. Amazon Mechanical Turk thus proposed the first service to integrate Artificial Intelligence directly into business applications (Bezos, 2014*)*. Amazon subsequently extended this process to the most varied activities. With *Mechanical Turk* algorithmic is at the center of the production process with two innovative features, the first, as we have seen, is that it provides work to people and does not realize it for them, the following aim is in its ability to increase the *pull system*[7] production cycle, thus encountering and radicalizing concepts of *toyotism (*Bergvall-Kåreborn, Howcroft, 2013 - Pierreval, Tautou, 1997 - Price, Gravel, Nsakanda, 1994).

- ✓ the adaptability of the workforce
- ✓ the constant acquisition of data
- ✓ information sharing as an incentive for permanent advancement
- ✓ the destruction of the production flow
- ✓ persistent checking and assessment of production activities

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[3] *Given the business evolution of Amazon from a bookstore to the store for everything, we had to reinvent automation, following the Lean principle of "autonomation …The spirit of lean management was already at Amazon when I arrived in 2007. Since the day he created Amazon, Jeff Bezos has been totally customer centric*." (Mark Onetto, 2014)

[4] Cloud computing is based on the virtualization and abstraction of IT processes: data collection, storage and processing operations can be dynamically distributed across different machines and devices connected through increasingly fast networks. We are faced with a enterprises made of algorithms that connects and incorporates, along with the servers of companies, devices of different types (smartphones, computers, smart TVs, gps systems, sensors, etc.). In this scenario, platforms are increasingly complicated and dynamic architectures of software, hardware, interfaces subject to continuous transformations and reconfigurations implemented on technologies (smartphones, tablets) that often also belong in physical terms to the users themselves (Parker, et al. 2016).

[5] "*While computing technology continues to improve, there are still many things that workforce can do much more effectively than computers, such as identifying objects in a photo or video, performing data de-duplication, transcribing audio recordings or researching data details. Traditionally, tasks like this have been accomplished by hiring a large temporary workforce (which is time consuming, expensive, and difficult to scale) or have gone undone. MTurk aims to make accessing human intelligence simple, scalable, and cost-effective. Businesses or developers needing tasks done (called Human Intelligence Tasks or "HITs") can use the MTurk API to access thousands of high qualities, global, on-demand Workers—and then programmatically integrate the results of this work directly into their business processes and systems. MTurk enables developers and businesses to achieve their goals more quickly and at a lower cost than was previously possible*" https://www.mturk.com/

[6] In 1769, the Hungarian nobleman Wolfgang von Kempelen amazed Europe by building a mechanical automaton that defeated almost all the opponents he faced. A life-size wooden mannequin, adorned with a tunic and turban, the "Turk" of Kempelen sat behind a wardrobe and toured Europe. To convince the skeptical public, Kempelen opened the cabinet doors to reveal the intricate array of gears and springs that drove his invention. He convinced them that he had built a machine that made decisions thanks to artificial intelligence. What they didn't know was the secret behind the Mechanical Turk: a chess master cleverly hidden inside.

[7] In knowledge work and in software development, the aim is to provide a visual process management system which aids decision-making about what, when, and how much to produce. The underlying pull system embedded in the kanban method originated in lean manufacturing, which was inspired by the Toyota Production System (Anderson, David 2010).

The Platform economy is a new business model evidently different from a Fordism model which had the following traits:

- Mass production
- Mass consumption
- Vertical integration

But within this model of digital business there is a distinction too from the post Fordist model (*Lean production*):

- Just in time production
- Individualized consumption
- Lean Business
- Just in time workforce

Platform economy is a radicalization of *Lean production principles* but at the same time a break with that model (Srniceck, 2017). Platforms shift from these business historical models of business for several reasons. First, digital platforms are business entities that can be defined at the same time as a virtual intermediary and a physical infrastructure (Launde, De Minicis 2021). Platform mediates on the web between different groups of interest users, advertisers, drivers, riders, clients, firms but at the same time is too an infrastructure that guarantees value to those relations (Plantin et al., 2018). Platforms provide a set of shared technologies, tools, and interfaces to a large group of users who can build what they want on a stable infrastructure. Some digital platforms start on other platforms. Many of today's Platforms use Amazon Web Services. Uber itself for mining big data does not use a proprietary platform. These two dimensions of the digital platform (Intermediation - Infrastructure), interaction and production of different tools are realized with the big data. As we shall see, data mining and profiling are not in digital platforms a tool to improve and increase value in production but the aim of business. Even the use of algorithmic is not aimed at supporting the work of internal management but embedded itself the management and the employer plan (Vallas, Schor, 2020). Thus, the existence of the following features to define a virtual business model such as a digital Platform.

Features of Digital Platforms

A Digital Space composed of software and hardware to be defined as a capitalist model of business specified in the form of a Digital Platform need to show the following effects:

- *Networks effects* - The more people use a platform, the more value the platform takes on. This determines a tendency of platforms to move to assume a monopolist role. Their natural tendency is to assume the totality of the market increasing data acquisition and profiling. This dynamic also go on through the acquisition of other platforms so their data and profit margins arise from the trend and the acquisition of monopolies. Facebook, for instance, has become the preferred social networking platform globally by virtue of exceeding a critical threshold of members. A similar argument can be made for Google, the more users search, the better the results produced by the search algorithms and the more useful the search engine becomes for all users. The circumstance produces a further positive feedback loop whereby more users generate more users. The same dynamic offers platforms the possibility to analyze more and more online interactions producing more and more data. The ability to rapidly scale up many of the platform's activities (including data analytics) by exploiting pre-existing technologies and infrastructures with very low marginal costs (software, hardware) means that there are few natural limits to this kind of development. One of the reasons for Uber's rapid growth, for example, is that it does not need to build new industrial unit, but only needs to rent more servers. Microsoft in the 2016 bought LinkedIn for 22 billion of dollars to expand its process and its network of data mining[8], similar case for the Elon Musk twitter acquisition[9].

[8] In June 2016, Microsoft announced that it would acquire LinkedIn for $196 a share, a total value of $26.2 billion, and the second largest acquisition made by Microsoft to date. The acquisition would be an all-cash, debt-financed transaction. Microsoft would allow LinkedIn to retain its distinct brand, culture, and independence. Analysts believed Microsoft saw the opportunity to integrate LinkedIn with its Office product suite to help better integrate the professional network system with its products and big data.

[9] Musk completed the twitter acquisition on October 27, 2022, for $44 billion. Musk immediately fired the top three Twitter executives. About a week later, he began laying off about half of the company's approximately 7,500 employees.

- *Cross-subsidization effect*[10] - This aspect is very remarkable because it is very altered the post-Fordist model of production. In the *lean production* every process of production that doesn't produce profit for the company is cut, platforms do not use this concept. A typical Platform like Google for example offers email services for free but generates revenue as an advertising platform selling digital spaces where the firms insert their advertisements. So, in the platform production system to extract value some services are free others have prices that grow steadily (Kung, Zhong 2017). The idea of this digital firm is to be able to balance these aspects by attracting users with the offer of some services and then making them pay for others. In this way the platform tries to reach its primary aim mining as much data as possible.

Design core architecture effect – This feature characterizes the platforms as infrastructures not neutral but characterized by a precise employer policy that conditions the markets, companies, and users (customers and workforce) that interact with it. This means that the intermediation of the platform contains political elements. For example, Uber in some cases offers more drivers and cars in its screen than are available demonstrating more supply than available. This strategy determines a definable effect called *price hike*, creates more demand for the available supply, more users on board through an artificially created system (Srniceck, 2017). Facebook only allows some topics and activities in its platforms, another instance of the political core of platforms, Airbnb adjust fees over time and the quality of services by hosts through continuous messages and advice (Bruni, Esposito, 2019*)*.

Algorithmic Management effect - In the platform economy, algorithmic management is defined as an intelligent system of control in which machine learning algorithms are deployed to organize, direct, coordinate and monitor the production process without human involvement or oversight (Kellogg et al., 2020). Hence, algorithmic management can be viewed as a combination of computer and normative control. In the model of platform, a set of rules, norms, specifications, and regulations are embedded into programs dominated by automatic algorithms in apps (Ashford et al., 2018). Consequently, the platform acts as a virtual whereby the business processes are coordinated and instructed by advanced algorithms step by step with close monitoring (Gandini, 2019). Scholars argue that in the platform economy managing activities are transferred from humans to sophisticated algorithmic technological systems (Curchod et al., 2019; Schildt, 2017), management is no longer a human practice, but a process embedded into technology, specific algorithms were deliberately designed to remain obscure and mysterious in their actions and functions. This dynamic of digital production is determined from the comprehensive transformation of algorithmic technology, a synthesis of AI, machine learning and big data (Schildt, 2017). Digital management does not simply use algorithms for control but trusts on the algorithms to incorporate other conventional managerial methods into the managerial ecosystem (Duggan et al., 2020).

Management by multiple stakeholders - In contrast to the employer-to-employee management strategy, the platforms have developed a original governance model whereby different key stakeholder's production process are involved in managerial control, including customers, labor supply company, firms and in some cases government. The platforms use their apps to introduce stakeholders to participate in managerial activities and the platforms themselves played a dominant role in coordinating different aspects. A multidimensional supervision network over firms, users, customers, and workforce (Duggan et al., 2020).

Carrots and sticks effects - The rewards and punishments embedded in algorithmic control are an indispensable part of the technological infrastructure for platform performance management. For instance, in the lean or labor digital platform besides monetary rewards, more privileges are given to drivers with a higher ranking. The higher the ranking a driver has, the sooner the platform will respond to their appeals regarding customer complaints and the more opportunities drivers receive to filter out unprofitable orders and seize new orders. Thus, this system favors veteran drivers. Points for the ranking are collected according to algorithmic assessment, which is based on factors such as workload, customer reviews and work undertaken during adverse weather. Thus, drivers are spontaneously engaged in maintaining a high ranking. This system shows how platforms encourage drivers to adhere to expanding labor efforts for long-term control. But if a rider reduces his workload, receives complaints, or gets a penalty from traffic police, his points drop dramatically. In the piecework regime of platform work, severe punishments impose on workers are more effective than incentives (Kellogg et al., 2020).

[10] The cross-subsidization definition is the strategy of funding one product with the profits of another. With this type of pricing strategy, a business intentionally prices one product above its market value. This extra profit covers any losses derived from pricing a separate product below its market value.

Planetary effects – This dynamic thanks to the algorithmic management in combination with the possibility of logging into the platform from any place with a stable internet connection allows the inclusion of a broad range of workers, firms, customer, advertiser, supporter in the virtual space of the platform. This access takes place from homes, internet cafés, mobile phones…. This process opens new forms of value production for the capitalism business (Jones, 2021).

Invisible compulsory labour-time - This mechanism concerns a specific kind of platform: the *lean platform*. The effect is achieved through the allocation of working shifts based on workers availability, speed, and order acceptance/rejection; in crowdwork, it is achieved through the creation of online reputations based on workers' speeds, ability, and quality of task achievement (De Groen, Maselli, 2016). In work on-demand via apps, every choice made by platforms, from the assignment of gigs to the management of shifts, is established by an algorithm, which is designed for time and resource optimization of work delivery. Platforms, such as Uber, UberEats, or Delivero, maximize flexibility and minimize labor costs by calling on and paying workers only for the specific timespan needed to perform the task (Tassinari, Maccarrone, 2020).

The Digital Labor Platform Classifications

An interesting classification is offered by Srnicek 2017, who categorizes digital platforms according to five main types: 1) 'advertising platforms' (Google, Facebook) that extract information about users, analyze it and then use the artefact to sell advertising space; 2) 'cloud platforms' (AWS, Salesforce) that own the hardware and software needed by digital businesses and make it available on demand (cloud computing): 3) 'industrial platforms' (Predix by GE, MindSphere by Siemens) that build the hardware and software needed to transform traditional manufacturing companies into digital production processes based on the Internet of Things (for these processes and their supporting procedures, Germany created the term Industry 4.0, later adopted in Italy as well); 4) 'product/capital platforms' (Rolls Royce, Spotify, Zipcar) used to transform goods into services (good as a service model), for example with the shift from the purchase of a car to the access to the most suitable means of transport at the moment of need; and, finally, the 5) 'lean/labour platforms' (Uber, Deliveroo, Amazon mechanical Turk...) that acquire, organize and sell work performances in the digital space. Platform work tends to be divided into two macro-typologies 1) Online web-based platforms: with tasks made only online, whose productive phases are not locally organized, with a exclusively cognitive productive process finalized to the production of digital products, realized in the virtual space. Its work performance essentially belongs to the digital business (design, translation, image identification, development of software). The tasks are outsourced in micro-components in any area of the world. The main platforms belonging to this kind are Amazon MechanicalTurk, Upwork, Speaklike, Addlance... There are then the so-called 2) location-based platforms, in which work performance is realized both online and offline, in virtual and physical space. Tasks with highly localized performances essentially characterized by traditional tasks (delivery, transport, home care). The main one's platforms are Deliveroo, Uber, Justeat, Glovo...

Another interesting classification is that offered, starting from the consideration of technological aspects, by Martin Kenney and John Zysman of the University of Berkeley (Kenney, Zysman, 2016). In all categories of digital platforms, the authors point out, a central role is played by the algorithmic component of the technological infrastructure. Algorithms have a fundamental importance not only in the analysis of data produced by users, but also in the definition of substantial aspects of the platform's activity such as the elaboration of economic strategies. The *Lyft car-sharing platform*, for example, integrates mapping software, real-time analysis of road conditions and driver availability to provide price estimation. Drivers are checked through online checks whose outcome affects the transfer of payments made, obviously always online, through credit cards. This the Kenney, Zysman classification:

Platform for Platforms

These are digital platforms that enable and support the operation of other platforms. The Internet itself, in some way, can be considered the platform for platforms ante litteram, a platform within which search engines as with Google act as a mechanism. Other examples are IOS, Apple's operating system or Google's Android: both are platforms of operating systems for smartphones on which huge ecosystems have been

built. In addition, there are companies that provide infrastructure and tools for the rest. For instance, Amazon Web Services, Microsoft Azure, and Google Cloud Platform make it easy to build cloud services, the tools with which other platforms are built

Provision of online tools for the creation of other platforms

Environments such as GitHub belong to this category of platforms, which has become the reference repository for all open-source software developers. In addition to making code sharing possible, GitHub offers a wide range of development support tools while considerably reducing the cost of software tools. Other platforms such as *Zenefits, Job Rooster and Wonolo,* provide cloud tools and software to support different categories of business activities (e.g. sales, human resources and accounting management), which were previously sold or rented by companies such as Oracle and ADP.

Job mediation

Digital platforms are used in various ways to mediate in the world of work. Some platforms transform the work of professionals previously adjusted to operating independently. LinkedIn, for example, helps the activities of HR departments by selling access to information given free of charge by users. Other platforms such as Amazon Mechanical Turk, which allows companies to crowdsource the execution of specific tasks requiring human intervention, thus emerges a modern form of outsourcing of work activities.

Retail

Digital platforms that implement increasingly advanced forms of retail. The best-known platforms are Amazon, eBay, and Etsy, beside a multitude of others.

Provision of services.

Platforms designed to play an intermediary role between supply and demand in the provision of services. *Airbnb* and *Lyft* are two of the best-known examples. Together with them is a very wide range of platforms active in the financial sector, from sites to support the financing of projects, such as *Kickstarter* or *Indiegogo,* to platforms that intend to replace traditional financial institutions, such as *AngelsList for* venture capital and *Zopa* and *Rate Setter* for peer-to-peer lending. *Transfergo* and Transferwise, on the other hand, offer online services to simplify global money transfers.

The centrality of the data – mining in the Platform production

The control and availability of information is what allows platforms to maintain a monopolistic position on a given market thanks to the ability to coordinate supply and demand; as well as to increase its size[11] by increasing efficiency and reducing the costs of goods and services offered. The nature and characteristics of the networks that the platform generates and/or controls as well as the quantity and quality of data held and used for economic purposes are a vital component in recognizing hierarchical relationships between different platforms. Platforms that control relatively less strategic and more circumscribed networks or that be dependent on underlying platforms, as in the case of Uber or other platforms that provide off-line micro-services (De Stefano 2016) also exploit the data contained in the networks they control to maximize sales and profits (Srniceck, 2017). This type of platform tends to be dependent on the underlying platforms having to pay rents whose amount is linked to the market power that the underlying platform holds. This dynamic is well described by Srnicek in Platform Capitalism book. This author emphasizes the tendency of large platforms that have among their activities the concession of segments of the networks they control or the provision of services that axis on them – i.e. for example, the cloud services offered by platforms such as Google or Amazon – to incorporate the consumers of concessions and services. Zuboff (2015) highlighted the change of state to which data are subjected in the process of enhancement and management of the network that the platforms put in place. Personal data that are initially extracted are called data *exhaust* indicating to the fact that as such, when they are initially extracted, they would have no value. The value is acquired when adding together this information goes to constitute digital profiles that can be transformed into economic value, through the algorithmic function

[11] Think of the ability of platforms such as Uber or Amazon Mechanical Turk to guarantee immediate access to work and goods markets to a multitude of individuals who would never have had access to them given the traditional regulatory and technological framework. A classic example is that of the multitude of individuals who in urban agglomerations become taxi drivers through the Uber platform, evading regulatory constraints that until a few years ago significantly restricted the supply of labor in this sector.

and the different profiling and data processing systems (machine learning ...). All the different characteristics and purposes of the platform landscape stem from this power: the regulation of markets, prices, control of fragmented labor, businesses and customers who trust on their intermediation, the production of Internet of things. The real revolution in the business of contemporary capitalism has been the ability to extract and then determine value from data allowed by algorithm development. The future platform trends hypothesized by the international literature highlighted three different scenarios: 1) the strengthening of monopolistic dynamics (Srniceck, 2017) 2) the building of cooperative platforms (similar experiences have been tested in some sectors of the location platforms in France and Italy (Martinelli, 2019 - Le Lay, Lemozy, 2023). In this case the limit is the lack of an important mass of data and network effects and finally 3) a hypothesis presumed with the growth that platforms have had during the pandemic phase, creating a kind of public ecosystems, a public control of platforms (Srnicek, 2019), but too in this case the biggest constraint is in the acquisition of big-data and in the hod of developed tools of datamining.

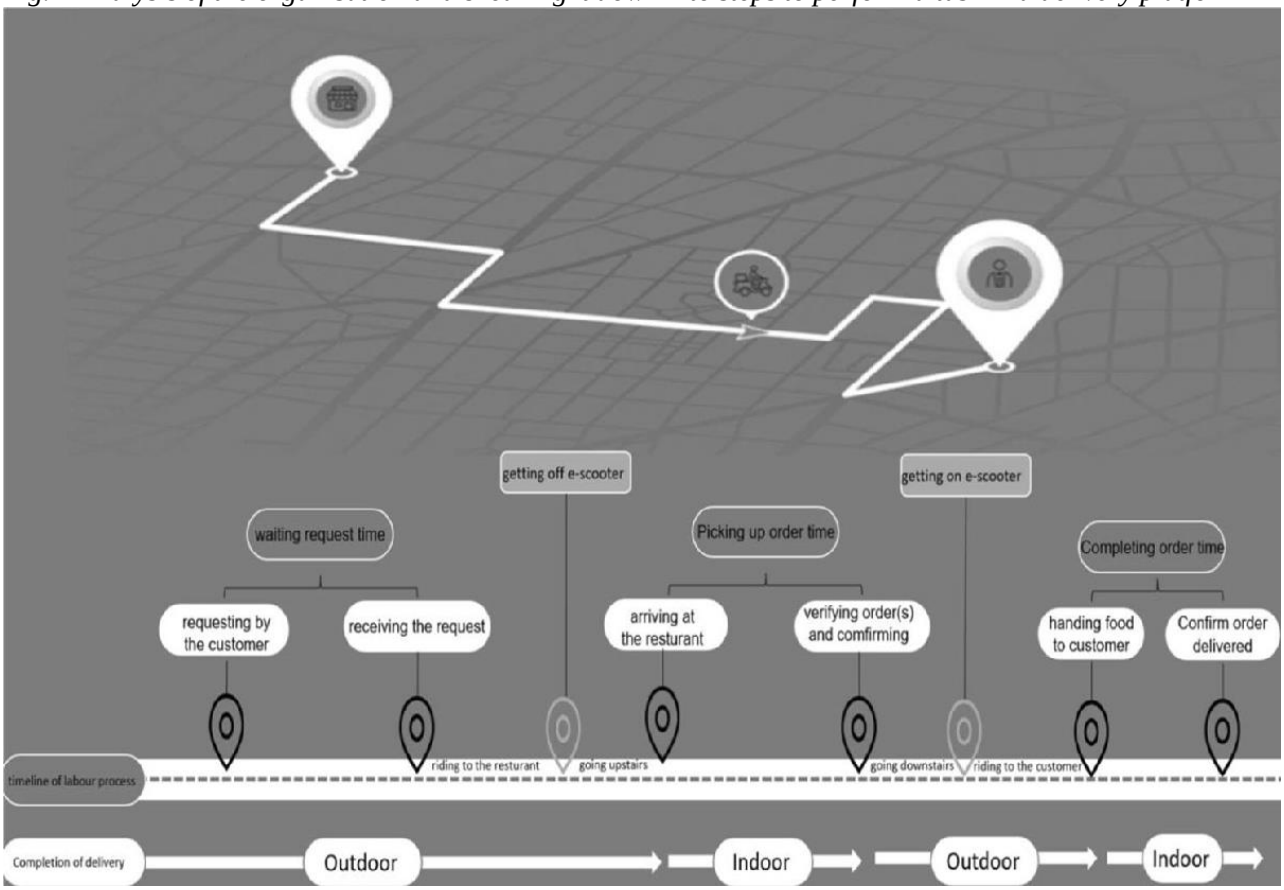
The algorithmic management in the Lean Location Platform of food delivery

Over the past decade, there has been a growing body of research to understand the work processes of algorithmic management, including control technologies (Shapiro, 2018; Veen et al., 2020; Wood et al., 2019). The implications of precarious work and the algorithmic resistance of workers (Tassinari & Maccarrone, 2020). However, algorithmic work processes cannot be fully studied without a scientific analysis of the managerial processes designed to organize work.

As Vallas and Schor (2020) argue, it is essential to clarify the algorithmic design process, and if platforms represent a distinct type of work organisation and a governance mechanism that reflects the institutional landscape or an organizational and management process in close continuity with specific industrial production processes. For instance, form scholars like Steinberg, 2022 Platform capitalism should be seen as an right extension of toyotism production culture, in an evolutionary managerial continuity of post-Fordist automotive capitalism, rather than a complete break with taylorist principles, born out of the media and cognitive production insights of Silicon Valley in the 1990s. To underline Vismann's argument that a history of files therefore also contains a prehistory of the computer" (Vismann, 2008,), *we must note that the history of toyotism contains a forgotten prehistory of platform capitalism*. This becomes even clearer when we observe, as mentioned above, how everything from business organization (e.g. lean organisation) to software programming (e.g. lean) to start-up philosophies (e.g. lean start-up; Ries, 2014) revolves around the mantra of "lean start-up" (Cusumano, 1991). Thus, for some scholars, we should consider with some caution recent writings in organisation studies that assume the demise of firms will result from the rise of digital platforms (Davis, 2016). Platforms are not so much technological objects that lead to the demise of companies, as they are managerial objects that enable companies to offer and distribute products and services by other means. Steinberg's theory thus traces the gig economy back to longer histories of outsourcing and precarious work in the automotive sector, tracing its genesis to practices developed to regulate production in Toyota factories. *This line is more relevant today as the platforms themselves are completing their cycle from car factories to smartphones to cars with Uber, Didi, Tesla, Waymo, Apple and their experiments in autonomous driving and city mapping* (Chen & Qiu, 2019), not to mention the persistent rumors of technology companies entering the car manufacturing business. A case in point is the recent announcement that Foxconn, Apple's main supplier for smartphone manufacturing, is entering the electric vehicle business (Hille, Inagaki & Campbell, 2021). As smartphone manufacturers move into electric vehicle production. Location-based platforms use apps to network the outsourced workforce, just as toytoism used digital technology to network all the companies that outsource production parts. A important difference between the two management models is the one related to management, which, as we have seen in platforms, appears to be free of the human supervisor (Launde, De Minicis 2021). Apps represent a key point of production and play the role of manager, and their construction can be too outsourced to other IT companies outside the same platform. In this algorithmic management model, the drivers of the lean delivery platforms that deliver food work as virtual assembly line workers, following the procedure of algorithmic operations with no human digital management. In this sense, Figure 1 provides an overview of the entire production process of food delivery platforms. The figure shows in a Toitysm Tayloristic way, i.e. by means of a scientifically organised breakdown of the work process into

stages, the work performance of a single driver's task, from the assignment after the rider's log-in to the delivery of the meal to the end customer.

Fig. 1 Analysis of the organisation and breaking it down into steps to perform a task in a delivery platform



Fonte: Huang, 2022

The figure concerns the working process of a rider subjected to a piecework (free login) or shift system. In the two cases, the link between task performance and wage payment differs. In the first case this corresponds to the picking up of the meal at the restaurant (picking up order time) in the second to the start of the waiting for the order (waiting request time). In piecework riders the waiting time for meal delivery is not paid, in shift riders it is. But in general, in both cases, every step of the work process revolves closely around the app and is based on algorithmic automation. The labour recruitment process is carried out via an online form. Jobseekers must first download a designated app, register, and then upload a scanned copy of their national identity card, certificate of residence or residence permit onto the system. It is important to note that this step implies an indirect collaboration between the platform and the government, where the control of the process is entirely managed, and information is held exclusively by the platform. In fact, there is no access app intermediated by a public digital identity. Furthermore, in some international contexts, the platform is allowed to access the government's powerful civic surveillance system (China, India…), based on demographic big-data, to determine whether the candidate is qualified for the job, particularly with regard to his or her criminal history and health, in some cases this is also the case for companies accessing the platform's intermediation and infrastructure, i.e. in cases where it is not the platform directly recruiting riders. The algorithms use other software such as google maps to indicate the route, the rider in many cases must follow the directions of the management algorithm with respect to the route to be followed and the arrival times in the different areas that make up the production process. In some cases, the directions are given via earphones, which allows the rider to ride freely following the orders of the work process (speeding up the process, changing direction) or to deliver several orders in the same task. Earlier to access work services, all delivery platforms require riders to attend an online professional training course in the apps, which includes approximately 15 minutes of videos concerning standards and rules related to food delivery services. The results of some international analyses (De Minicis, 2023) show how the digital employment relationship, the forced logging out of riders on the basis of game-based tactics, a contingent survival salary and the opacity of sanctions can be considered as

broader phenomena of employment deregulation in the platform economy, with labour law objectively struggling and having to chase the forms of labour organization evolution applied by digital capitalism (Shapiro, 2018; Vallas & Schor, 2020). Among other things, not even regulations and rulings restrain this extension of the gig economy, and platforms manage to adapt their algorithms to evade new forms of regulation, even increasingly radicalising the type of social fragility of the hired workforce, from students or subjects with histories of long unemployment, or migrants, or rural people (Chinese case). In this case, the issue is the increase in the capitalist business process of informal labour, which in Marx's sense can be considered as a new potential labour force (Mezzadra, 2023). In the Italian context after years of debates and discussions between different perspectives of regulation of the sector, with the re-proposal in the 2019 law of an extension of the concept of *eterorganizzazione* for the regulation of rider work (De Minicis, 2023), the category contract currently in force provides for a status of autonomous work on hourly piecework where platforms appear not as employers but merely as technological intermediaries between different interest groups, restaurateurs, customer, workforce. Another element to be highlighted even where public regulation forms provide for the recognition of riders as employees, rider law 2021 in Spain, is the enormous use of a fragi labour force (migrants) (De Minicis,2023a). This workforce considers in the formal labour market digital work as a lack opportunity to found means of subsistence or to achieve residence permits, documents for the residency. This dynamic is cleverly used by platform capitalism to undermine the bargaining power of riders and traditional trade unions (Huang, 2023), turning the migrant in westwrn countries or rural population in other international scenarios into a pool of cheap labour (Pun, 2015). Moreover, the weakness of trade unions in protecting the rights of digital workers coincides with the powerful surveillance system of platforms that curbs workers' mobilization, thus consolidating the strength of digital capitalism (Meiutan, 2019). Despite spontaneous mobilisations of workers (Marrone, 2021). Finally, a central aspect of platform capitalism untruths in the use of algorithmic management not only in the reorganization of labour without human management, but in defining regimes of standardization of markets and businesses where act, that are linked in its production process, through a complex and constant system of social game-based tactics ranking (rating, ranking, message…).

Conclusion

In this paper is present a first overview of the international literature on the genesis, characteristics and classifications of a business model developed after the 2008 financial crisis, referred to as platform capitalism. The paper also makes a first attempt to describe, through the analytical description of a work process carried out in a *Lean Food Delivery Platform*, how this business model is not an innovative capitalist production practice born on and for the development of a new form of digital automation, but the continuation of a historical management practice traceable in the Toyotas' production model. Over time, the application of algorithmic technology in place of cybernetic technology brings about a radical evolution and new productive developments for this culture of production organization. With the use of new tools, the platform transforms from an industrial and material production space into a digital capitalist production space, eliminating the boundaries between production and customer, between production and society. But the characteristic of the digital platform economy as a space of intermediation, a material infrastructure and a place of standardization was already a dynamic that had long been present in the Taylorism, Toyotas' model of automobile production. The aim of the paper was therefore to provide an initial cognitive insight within which to develop future analyses of specific aspects of lean platforms, following the analytical interpretations in (Steinberg, 2022 Srnicek, 2017). Future analyses will focus exclusively on the delivery platforms of lean locations. The perspective of future studies is to develop comparative international analyses of this phenomenon in three specific contexts: the Italian context, with a high deregulation of the phenomenon, the Spanish context, with a high regulation of the phenomenon, and the non-Western context of the presence of lean platforms. The objectives are 1) to understand in detail, in the three contexts, the functioning of algorithmic management 2) to consolidate more effectively the proposed hypothesis of a historical continuity of the production model of platforms 3) to analyze the typology and characteristics of the workforce used, in which sense the concept of informal work and potential work will be of considerable importance 4) to specify the state of regulation of the phenomenon. Whether it is possible to produce a traditional classificatory regulation of this production model or whether it is necessary to undertake innovative forms of regulation, such as the one proposed by Crouch in 2019.

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