

Cum Hoc Ergo Propter Hoc?! Reviewing the Literature and Building a Theoretical Foundation for Future Research in Crowd Delivery Workforce Participation

Completed Research Paper

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Abstract

A current trend is the use of crowd delivery platforms (e.g., Amazon Flex, Doordash, Grubhub) to cost-effectively manage the last mile. The success of such crowd delivery platforms depends on an adequate supply of transportation capacities. This paper conducts a literature review to identify the factors that influence participation in the crowd delivery workforce. We find that existing publications are scarce and that the few available ones have identified only single influencing factors. Due to their explorative-inductive nature without any theoretical anchoring, the results must also be critically reflected on. In such an effort and while considering the findings to date, we draw from the Self-Determination Theory (SDT) and the Unified Theory of Acceptance and Use of Technology (UTAUT) and develop a model of crowd delivery workforce participation to stimulate future deductive-confirmatory studies.

Keywords: Crowd Delivery Platforms, Crowdsourced Delivery, Workforce Participation, Theory Building

Introduction and Motivation

In recent years, e-commerce revenues have multiplied (United States Census Bureau 2017). What appears to be pleasing for e-tailers is in fact a substantial challenge for logistics, especially during peak times (Ziobro 2017). To meet customer expectations in terms of short delivery times, e-tailers and logistics service providers are working on concepts that increase flexibility. For instance, Amazon initiated its own crowd service called Amazon Flex. Other popular crowd delivery platforms can be found in the food delivery market (Hirschberg et al. 2016). Currently, almost every restaurant can offer delivery because platforms such as Postmates, Doordash or Uber Eat take over the logistics part and deliver the food to customers' doorsteps.

Crowd delivery is rooted in the concepts of crowdsourcing and crowd logistics (Castillo et al. 2018). Howe defined crowdsourcing as “[t]he act of taking a job traditionally performed by a designated agent (usually an employee) and outsourcing it to an undefined, generally large group of people in the form of an open call” (Howe 2006). The interaction between a crowdsourcer and crowd workers is usually moderated by Internet-based platforms. Sourcing within the crowd has successfully been applied to different value-adding activities. Now, this well-functioning concept is applied to logistics.

Buldeo Rai et al. (2017) defined crowd logistics as “[...] an information connectivity enabled marketplace concept that matches supply and demand for logistics services with an undefined and external crowd that has free capacity with regards to time and/or space, participates on a voluntary basis and is compensated accordingly” (p. 5). Carbone et al. (2017) distinguished between three types of crowd logistics: crowd storage, crowd local delivery, and crowd freight services. The remainder of this paper will specifically address crowd local delivery on the last mile, which according to Carbone et al. (2017) “[...] will probably have the strongest [disruptive] impact [...]” (p. 246) and therefore deserves special attention.

As with all crowdsourcing services, crowd delivery platforms must have a critical mass of participants – that is, drivers – to offer a competitive service because customers expect accurate, fast, consistent, and reliable delivery experiences (Frehe et al. 2017, Behrend and Meisel 2018). Against this background, this study addresses the following research-leading questions:

- *What factors have been found in the existing literature that impact participation in the crowd local delivery logistics workforce?*
- *How can the existing explorative-inductive knowledge be theorized to stimulate future deductive-confirmatory research?*

Regarding the research questions above, this paper contributes to the existing literature by theoretically framing the existing explorative empirical research. This analysis could form the basis of a new deductive-confirmatory research stream that builds on the presented theoretical reasoning. Zhao and Zhu (2014) noted in their literature review that “[...] among the 55 articles we examined, only two used motivation theories in their studies [...]. We argue that more studies should take theoretical positions in understanding crowd’s motivation” (p. 426). Morschheuser et al. (2017) reached a similar conclusion: “Future research should increasingly employ theory from (motivational) psychology to justify research activities, operationalize research, and interpret results” (p. 37).

The rest of the paper is structured as follows. The next section gives an overview of the conceptual background. Then, a structured literature search is conducted to better understand what influences the participation of crowd delivery workers. The available findings are synthesized in the following section, using Self-Determination Theory (SDT) and the Unified Theory of Acceptance and Use of Technology (UTAUT), two established theories from applied psychology and information systems research, to develop a theoretical model and derive research propositions. Finally, we draw a conclusion and provide an outlook on future research.

Background

As explained in the introduction, crowd participation is imperative to the success of a crowdsourcing initiative (Sharma 2010). Due to its relevance, there are various publications that address the question of what drives people to participate in contexts other than crowd delivery. When comparing the available literature (e.g., Brabham 2010, Rogstadius et al. 2011, Väättäjä et al. 2013, Teodoro et al. 2014, Goncalves et al. 2015, Jiang et al. 2015, Deng and Joshi 2016, Mahmud et al. 2017, Ye and Kankanhalli 2017, Baumann and Gewald 2018) the following six factors can be identified:

- **Monetary compensation:** Monetary compensation includes all types of immediate payment received for the completion of a task. The payments are either considered to be a primary or secondary income.
- **Skill development:** By performing tasks, crowd workers have the opportunity to acquire new skills or at least improve their existing skills. Such skills can be transformed into delayed payoffs.
- **Job signaling:** Crowd workers are visible to their clients and thus have the chance to draw attention to themselves and their abilities and to qualify for better-paid positions.
- **Enjoyment:** While performing their tasks, workers can feel joy. This joy is especially due to the versatility of the tasks and the satisfaction that results from the completion of the tasks.
- **Social exchange:** People are social beings who draw satisfaction from the exchange with other people. For example, friendships can be made through the job.

- **Autonomy:** Autonomy refers to the degree of freedom in the execution of tasks. By definition, crowd workers are not part of a hierarchical organization but manage their own schedule independently. They choose when to work and for how long. The concept of autonomy also includes the freedom to make one's own decisions and to live out one's creativity.

Although the factors mentioned often influence decisions on whether or not to participate, it should be noted that each area of application has its own particular characteristics. Crowd delivery differs substantially from other crowdsourcing initiatives in terms of the activity to be performed. Leicht et al. (2016) distinguished between the following five archetypes of crowdsourcing: (1) microtasking; (2) knowledge work; (3) design competition; (4) testing and validation; and (5) innovation. Crowd delivery does not fall into any of these categories. Essentially, a shipment delivery is a repetitive, physically demanding activity under changed conditions (delivery location, shipment size), which is usually carried out alone. It is therefore obvious that the mentioned factors of “skill development” and “social exchange” play a subordinate role.

Like other scholars, we argue that it is necessary to acknowledge these peculiarities that reflect the motives of the respective crowd, which is crucial to reach the critical mass and to attract the most effective workforce (Lohr 2009, Sharma 2010). Therefore, we are confident that crowd delivery requires stand-alone research that leads to the focused literature review in the following section.

Literature Review

A prior general literature review on crowd logistics was performed by Mehmman et al. (2015). Our literature review is more specific and concentrates on the contributions that help us to understand why people work in crowd delivery and what motivates them. Methodologically, the review follows the guidelines of Denyer and Tranfield (2009).

Methodology

Denyer and Tranfield (2009) structure the research process in the five steps of (1) question formulation, (2) locating studies, (3) study selection and evaluation, (4) analysis and synthesis, and (5) reporting and using the results. The first step refers to RQ1; that is, the review is conducted to identify the studies that contribute to the understanding of participation in crowd local delivery. Steps (2)–(4) are described in the following section and the final step (5), reporting, can be found in the subchapters thereafter.

Because Mehmman et al.'s (2015) general review led to only 14 relevant papers, we did not expect a large amount of relevant studies regarding our more specific topic. To avoid missing any paper of interest, we intentionally used the very general queries of “crowd logistics” (CL), “crowdsourced delivery” (CSD), “crowd delivery” (CD), and “crowdshipping” (CS). The search was conducted in December 2018 in the online databases of Business Source Premier (via EBSCOhost), ScienceDirect, JSTOR, Econbiz, Web of Science, and Google Scholar. Concerning Google Scholar, patents and citations were excluded. To ensure quality, the analysis was limited to accessible, peer-reviewed scientific articles and conference papers in English. After eliminating duplicates, we checked the metadata (title, abstract, and keywords) of each article to determine whether they contained a link to the investigated research question. If the metadata did not refer to participation or motivation in crowd delivery, the entire paper was scanned. We searched the digital version of the paper for the two abbreviated terms “partici” and “motiv” to locate all content related to participation and motivation and we read the surrounding text. The shortlisted articles were then read in full length and definitively assessed in terms of relevance. The three exclusion criteria were as follows:

- **Not original:** In emerging disciplines such as crowd delivery, it is typical that early versions of a paper are presented at conferences and published in the respective proceedings before finally being published in a journal. In such cases, the earlier versions were excluded.
- **Not empirical:** Several shortlisted studies referred to participation issues within their literature review or broached the issue conceptually. Such studies were not further considered

(e.g., Buldeo Rai et al. 2017). In contrast, studies with an empirical part to supplement the main research method (e.g., simulation model) remained under consideration.

- **Not the crowd worker’s perspective:** Because the motives of these papers are fundamentally different, they were excluded from further analysis (e.g., Punel and Stathopoulos (2017), who study the determinants of crowdshipping acceptance among senders).

To increase objectivity, the procedure was independently replicated by the coauthor. Following this procedure both authors identified only seven relevant papers. Once confirmed, the references of each article were searched for further publications of interest. However, none of these references were included in the detailed review list (see Table 1).

Table 1. Initial Search Hits and Final Selection

	Search term			
	CL	CSD	CD	CS
ScienceDirect	6	9	5	7
Business Source Premier	4	7	1	4
JSTOR	0	0	0	0
Econbiz	3	1	0	3
Web of Science	6	2	0	5
Google Scholar	112	106	44	118
Final selection (relevant search hits + footnote chasing)	7+0=7			

Participation in the crowd delivery workforce

Despite its importance for the success of crowd delivery, the empirical literature that addresses participation in the workforce is very limited. Currently, only seven papers contribute to the issue under investigation:

- (1) Paloheimo et al. (2016) documented the application of crowdsourced delivery to a Finnish library. In their six-week trial, 140 drivers registered for participation and performed a total of 93 deliveries. Drivers were compensated with 2–5 Euros per delivery. The authors subsequently conducted a survey in which 14 drivers participated and performed follow-up interviews to determine the reasons for participation.
- (2) Marcucci et al. (2017) empirically investigated the antecedents under which people would be willing to act as crowd delivery drivers. They surveyed 190 students from Italy.
- (3) Devari et al. (2017) used a simulation model that shows the benefits of crowdsourcing delivery to the social network of the customer. To make realistic model assumptions, a paid survey with 104 participants was conducted. The sample included different income and age brackets but was not representative.
- (4) Miller et al. (2017) investigated the willingness of individuals to deliver shipments during their commute by quantifying a potential shipper’s value of leisure time, which refers to the compensation necessary for potential drivers to join the workforce. They performed a discrete choice experiment with 143 graduate students, university staff members, and Amazon’s Mechanical Turk users.
- (5) Le and Ukkusuri (2018) analyzed a potential employees’ willingness to work as crowdshippers in the United States (n=549) and Vietnam (n=509) with revealed and stated preference models.
- (6) Serafini et al. (2018) conducted a stated preference survey in Rome with 225 participants to identify the most important features associated with the choice of acting as a crowdshipper.
- (7) Ermagun and Stathopoulos (2018) chose a different approach. This most comprehensive study to date used a large-scale data set (16,850 shipping requests over a two-year period) with real crowd shipping requests to investigate the various factors that influence the probability of a bid and the number of bids.

Comparing the results of the seven studies reveals ten potentially influencing factors (see Table 2). Based on the reviewed articles, we conclude that financial remuneration plays the most important role in workforce participation. However, the available publications suggest that other aspects should also be considered. Some of the findings seem to contradict one another. For instance, some of the studies point towards ecological reasons to perform crowdsourced deliveries (Paloheimo et al. 2016, Marcucci et al. 2017), while Serafini et al. (2018) found the “green attitude” to be nonsignificant.

Table 2. Factors Influencing Participation in the Crowd Delivery Workforce

Factor	Found in							Example with reference
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	
Financial	✗	✗	✗	✗	✗	✗	✗	“Monetary compensation was considered to be important [...]” (Paloheimo et al. 2016, p. 244)
Time availability	✗			✗	✗			“[...] 20 % chose that they did not have enough available time [...]” (Miller et al. 2017, p. 70)
Task characteristics	✗	✗	✗	✗	✗	✗	✗	“[...] we consider appropriate specifying crowdshippers’ utility functions using the following attributes: pick-up/delivery place [...]; maximum deviation length [...]; minimum required lead time to perform delivery [...]” (Marcucci et al. 2017, p. 842)
Ecological	✗	✗	✗					“Support the environment” (Paloheimo et al. 2016, p. 244)
Community	✗		✗		✗			“As shown, the vast majority of people, 72 %, will accept or deliver a product only for or to their close friends or close friends.” (Devvari et al. 2017, p. 109)
Socio-demographics		✗		✗	✗	✗	✗	“[...] those respondents with higher incomes are less likely to be interested in working as crowdshippers.” (Le and Ukkusuri 2018, p. 14)
Built environment		✗					✗	“[...] the employment density is negatively correlated with the probability of receiving a bid” (Ermagun and Stathopoulos 2018, p. 476)
Service implementation	✗	✗			✗			“Additionally, driver activity affected by the service implementation. [...] It could be hypothesized that [...] capable drivers [...] would require a real time smartphone application.” (Paloheimo et al. 2016, p. 245)
Mobility availability		✗			✗	✗	✗	“The rate of families with two or more vehicles, the accessibility of jobs by auto in the 45-min threshold at the trip origin [...] have the most pronounced positive effect on the probability of receiving a bid.” (Ermagun and Stathopoulos 2018, p. 477)
Miscellaneous	✗			✗	✗			“Several attitude statements also relate to higher acceptance of crowdshipping: [...] when a person agreed that they [...] use their time well in the car, and disagreed that they work well with others [...] Attitudes leading to lower acceptance of included selecting the option “never would work as a crowdsourced shipper” [...]” (Miller et al. 2017, p. 71)

All seven studies are based on an inductive-explorative approach. Therefore, they shed some light on the issue and provide a good starting point for a deeper and wider analysis. However, a self-contained, theoretically grounded foundation is missing, which is why the results should be treated with great caution. The existing studies only report correlations. The following examples from the most recent and most comprehensive study to date by Ermagun and Stathopoulos (2018) are intended to illustrate the risk of drawing false conclusions:

- The study authors conclude that the ethnicity of the populations influences supply: “[...] the percentage of African-American residents has a positive correlation with the probability of receiving a bid [...]” (p. 476). Therefore, is ethnicity a reliable predictor of the supply of drivers? Or is it a case of fake causality (*cum hoc ergo propter hoc*)? It is much more plausible that the observations are a consequence of the well-documented wealth gap (e.g., Shapiro et al. 2016). Therefore, it is not membership in any ethnic group but lower prosperity that motivates these people to accept such jobs.
- Moreover, the authors report that “[...] an increase in delivery distance not only decreases the chance of receiving a bid, but it also diminishes the number of bids.” (p. 475) However, does this really mean that the supply of potential drivers decreases with the delivery distances or do transport orders with more distant destinations have a low relative contribution margin due to too low remuneration at higher costs (Minnesota Freight Advisory Committee 2017) and are only for this reason less attractive?

These examples show that without appropriate theoretical framing, there is a great danger of erroneous conclusions being drawn. This issue refers to the second research question. For this reason, the following section frames the existing findings by using established theories and derives a model of crowd delivery participation.

Theorizing Crowd Delivery Workforce Participation and Deriving Research Propositions

Participation in a crowd refers to human behavior. It is therefore an obvious choice to use behavioral theories. We refer to the two prominent theoretical frameworks of SDT and UTAUT. SDT is a theory of motivation that provides guidance on how to get someone to consistently perform a task. In contrast, UTAUT is an information systems theory about technology acceptance. Because crowd delivery is a human activity (delivery task) in a technology-driven environment (crowd delivery platform), a combination of both approaches appears to be promising and appropriate for the investigation at hand. In addition, both theories have proven their usefulness and applicability in meta-studies (Chatzisarantis et al. 2003, Venkatesh et al. 2016). The two complimentary theories will be briefly introduced and then used to derive specific research propositions (RPs).

SDT defines motivation as the underlying reason for a certain behavior (Deci and Ryan 1985). Thus, it does not see motivation as a unitary concept that focuses on the amount of motivation that individuals have for certain behaviors but instead identifies three types of motivation that predict specific desired outcomes (Deci and Ryan 2008). These types of motivation are listed on a continuum from low to high levels of self-determination (Gagné and Deci 2005): amotivation, extrinsic motivation and intrinsic motivation. Amotivation expresses disinterest in a task due to a feeling of helplessness and perceived incompetence. Extrinsic motivation entails performing a behavior for reasons external to the behavior itself. In contrast, intrinsic motivation refers to reasons inherent in the behavior.

UTAUT was presented over a decade ago and has since been extensively used in various fields, such as social networking, online shopping, and smartphone applications (Venkatesh et al. 2016, Pedrotti and Nistor 2016). The theory is based on a comprehensive review and comparison of the following eight behavioral and information technology acceptance theories: the theory of reasoned action; the technology acceptance model; the motivational model; the theory of planned behavior; a combination of the technology acceptance model and the theory of planned behavior; the model of PC utilization; the innovation diffusion theory; and social cognitive theory (Venkatesh et al. 2003). Four constructs are identified as the determining factors for behavioral intention and actual usage behavior, namely,

(1) performance expectancy, (2) effort expectancy, (3) social influence, and (4) facilitating conditions. Gender, age, experience and voluntary use moderate the influence of these four determining factors. In a subsequent longitudinal study, UTAUT was found to be superior to the eight previously reviewed theories to account for an impressive 70 % of the variance in behavioral intention and approximately 50 % of the variance in actual use (Venkatesh et al. 2003). UTAUT seems to be suitable for explaining participation in crowd delivery because it is strongly embedded in an IT-supported working environment (Durward et al. 2016). That is, to apply and manage delivery tasks, drivers must actually log on to the platform and use it. In addition, the remuneration is managed online.

Dependent variable

In the context of crowd delivery, the desired behavior is the frequent and reliable delivery of goods (Paloheimo et al. 2016). A platform provider is interested in committed and task-persistent crowd workers. Commitment refers to the willingness to spend extra time performing deliveries. Task persistence emphasizes the ability to continue delivering although it is difficult. The combination of crowd commitment and task persistence is referred to as crowd delivery participation in this paper, which is the dependent variable of the suggested research model.

Other variables

The variables that influence the dependent variable are derived by combining the existing findings with the two theories (SDT, UTAUT) by using theoretical reasoning. The first four variables are based on SDT, which states that a certain behavior depends on the type of motivation. Extrinsically motivated individuals perform an activity due to pressure and/or obligation, which can come from the outside or the inside (Deci and Ryan 2000). With external regulation, behavior is controlled by external factors such as rewards or penalties. Internal regulation resides within individuals if they engage in behaviors to obtain self-esteem or to avoid feelings of guilt and shame. SDT distinguishes between the following four subtypes of extrinsic motivation listed from high to low levels of regulation: (1) external motivation; (2) introjected motivation; (3) identified motivation; and (4) integrated motivation. In addition, there is intrinsic motivation that refers to reasons inherent in the behavior. Regarding crowd logistics delivery, this results in the four influencing factors of financial remuneration (external motivation), perceived autonomy (identified motivation), community-relatedness (integrated motivation) and enjoyment to deliver (intrinsic motivation).

The next five variables are based on UTAUT, which posits that the use of a system is directly influenced by behavioral intention and facilitating conditions. Again, behavioral intention depends on performance expectancy, effort expectancy, and social influence. Performance expectancy is defined as “[...] the degree to which an individual believes that the use of the system will help achieve gains in job performance” (Venkatesh et al. 2003, p. 447). In crowd delivery, it can also be assumed that individuals ask themselves how participation may positively affect their personal situation. Effort expectancy is defined as “[...] the degree of ease associated with the use of the system” (Venkatesh et al. 2003, p. 450). Because using a crowd delivery platform incorporates not only the use of IT tools but also the delivery of goods, this construct seems to have particular importance and is therefore referred to as delivery effort expectancy in this paper. The third factor, social influence, is defined as “[...] the degree to which an individual perceives that important others believe he or she should use the system” (Venkatesh et al. 2003, p. 451). In contrast, facilitating conditions are “[...] the degree to which the individual believes that organizational and technical infrastructure is available to support the use of the system” (Venkatesh et al. 2003, p. 453). Concerning crowd delivery, we consider the perceived platform support to be relevant. In the following section, the constructs and the presumed cause-effect relationships are introduced.

Financial remuneration

External motivation involves engaging in a behavior only to achieve a desired outcome (e.g., receiving a reward, satisfying external pressure (Deci and Ryan 2000)). The available crowd delivery literature identifies financial remuneration as one of the most important reasons to participate in the

crowd delivery workforce (e.g., Paloheimo et al. 2016, Marcucci et al. 2017, Devari et al. 2017, Miller et al. 2017, Le and Ukkusuri 2018). The crowd delivery participation increases with the amount of remuneration (Ermagun and Stathopoulos 2018). The focus is not so much on the absolute level of compensation as on the relative compensation in relation to the resources required:

RP1: A driver's financial remuneration positively relates to crowd delivery participation.

Perceived autonomy

With identified motivation, the behavior, which is considered to be important to achieve personally valued outcomes, is consistent with personal goals and is therefore accepted (Gagné and Deci 2005). This includes the desire to be one's own boss (Miller et al. 2017, Le and Ukkusuri 2018) or the additional flexibility of performing crowd deliveries. It is therefore not surprising that platforms claim that it is easy to "earn your own schedule" (Postmates.com 2019). Furthermore, Paloheimo et al. (2016) noted that "[...] the most active private, i.e. non-commercial drivers [...] used bicycles" (p. 246). Therefore, it seems that some drivers include crowd delivery in their workout routine to remain fit. Accordingly, we postulate:

RP2: A driver's perceived autonomy positively relates to crowd delivery participation.

Community-relatedness

Integrated motivation represents the full assimilation of the regulations that are completely adopted and embedded in an individual's behavior (Gagné and Deci 2005). Consequently, the behavior is congruent with one's own self-image. If integrated, a person identifies with the instrumentalized importance of the activity. Delivering can be considered to be important, particularly for the elderly, sick, and/or immobile, because it is likely the only possibility to remain independent. In Paloheimo et al. (2016), drivers mentioned the support of public services as motivation for participating in the trial. Regarding crowd delivery as a meaningful and important task may also cultivate a sense of community with other drivers. The formation of a community increases participants' sense of belonging and commitment (Zhao and Zhu 2014). This explains why existing delivery platforms emphasize the community feeling on their websites. For instance, Amazon Flex invites people who are interested in joining to meet other people who are delivering by presenting a dozen portraits about their respective crowd story (Amazon.com 2019). Thus, we propose that:

RP3: A driver's community-relatedness positively relates to crowd delivery participation.

Enjoyment to deliver

When a person is intrinsically motivated, he or she relies on the pleasure, fun, interest, enjoyment, and satisfaction obtained from engaging in an activity (Deci and Ryan 2008). Intrinsic motivation evokes positive feelings of personal growth and supports psychological well-being. Therefore, intrinsically motivated behavior is expected to lead to higher levels of activity and a higher quality of behavior compared to extrinsic motivation (Deci and Ryan 1985). Regarding crowd delivery, Paloheimo et al. (2016) found that the most active drivers expressed the desire to try something new as the main reason for their participation. However, the factor of endeavor-seeking was insignificant in Miller et al. (2017). This finding could be due to the composition of the construct, which contained four indicators that reflected both intrinsic and extrinsic motivators (optimism, enjoyment of trying new things, looking for new money opportunities, and the desire to be one's own boss). In addition, people who enjoy spending time in a car are more likely to deliver a package (Miller et al. 2017). Therefore, we propose that:

RP4: A crowd worker's enjoyment to deliver positively relates to crowd delivery participation.

Delivery intention

Similar to other behavioral theories, UTAUT posits that the intention to use a system influences actual usage. Intentions include both goals and plans. Individuals typically set goals before making plans on

how to reach these goals (Tubbs and Ekeberg 1991). Concerning crowd delivery, a notable goal would be to sign up for a platform as a prerequisite for using it. Registered users can then target a certain number of deliveries within a certain period of time. We therefore propose that:

RP5: The intention to deliver positively relates to crowd delivery workforce participation.

Performance expectancy

In crowd delivery, drivers can expect a certain level of compensation to account for their efforts (e.g., Paloheimo et al. 2016, Marcucci et al. 2017, Miller et al. 2017, Le and Ukkusuri 2018). The use of a platform and its IT tools may enable individuals to better use and organize available time windows. In this regard, Paloheimo et al. (2016) noted that service implementation appears to influence driver activity. During their trial, drivers were informed about the delivery request by email once a day. In contrast, professional crowd delivery platforms use real-time smartphone applications to effectively match demand and supply (Le and Ukkusuri 2018). Thus, we propose that:

RP6: Performance expectancy positively relates to the intention to deliver.

Delivery effort expectancy

Delivery tasks are heterogeneous regarding the time required, the distance travelled, and the size and weight of the shipment, which is referred to as task effort. Therefore, different tasks require different levels of involvement, resources, and capacities. Available research notes the dimensions of the shipment, the location of the pick-up and delivery place, the trip length, and/or time variability (e.g., Marcucci et al. 2017, Miller et al. 2017, Le and Ukkusuri 2018, Ermagun and Stathopoulos 2018). Consequently, we propose that:

RP7: Delivery effort expectancy positively relates to the intention to deliver.

Social influence

Social influence is defined as “[...] the degree to which an individual perceives that important others believe he or she should use the system” (Venkatesh et al. 2003, p. 451). This construct reflects the influence of other people on an individual’s behavior. Bozan et al. (2016) distinguish between coercive, normative and mimetic pressure. Coercive pressure can be formal and informal in nature and is exerted by a more powerful individual. Normative pressure refers to the phenomenon that if a behavior is adopted by a sufficiently large social group, individuals are more likely to unconsciously adopt it since it appears to be the right way. In contrast, mimetic pressure describes the deliberate act of copying behaviors of people who are more successful and who receive higher social recognition. Because crowd delivery is a voluntary activity, coercive pressure seems to be of limited importance. Normative and mimetic pressures are much more relevant. Accordingly, crowd delivery appears to have the potential to be positively recognized by the community due to its expected ecological benefits or its social aspect (Paloheimo et al. 2016, Marcucci et al. 2017, Devari et al. 2017). Devari et al. (2017) and Le and Ukkusuri (2018) found that people are particularly willing to deliver if there is a social relationship between the consignee and the driver, which refers to the concept of reciprocity. This understanding leads to the following:

RP8: Social influence positively relates to the intention to deliver.

Perceived platform support

For participation in the delivery crowd, it is mandatory to know how to use the platform. This explains why crowd delivery platforms invest in online qualification measures that put potential crowd workers in a position to perform the requested tasks well. For instance, Amazon Flex provides online tutorials that support newcomers in effectively using their app (Amazon.com 2019). Therefore, we propose that:

RP9: The perceived platform support positively relate to crowd delivery participation.

Moderating effects

UTAUT has found that the described proposed relationships were moderated by gender, age, experience, and voluntary use (Venkatesh et al. 2003). In a review of UTAUT publications, Venkatesh et al. (2016) noted that many studies support the generalizability of the theory but only with regard to its main effects. The moderators seem to be more dependent on the respective research context. In this study, we do not consider the proposed moderating effect of the voluntariness of use on the relationship between social influence and the intention to use. In contrast to an organizational context, participation in crowd work is voluntary by definition. Moreover, contrary to UTAUT, we do not concur that the influence of effort expectancy on the intention to deliver will only be significant in the early stages of new behavior and will become insignificant with increasing experience, because crowd delivery is inevitably associated with a changing task (e.g., package and routing characteristics).

The remaining moderating effects suggested by UTAUT appear to be reasonable. For instance, UTAUT posits that social influence erodes over time and becomes insignificant with sustained usage (Venkatesh et al. 2003). Regarding crowd delivery, it is very likely that low social acceptance and high normative pressures would hinder the initial usage of such a platform rather than the repeated execution of the delivery task. Over time, experiences with a platform replace normative influences and provide a more instrumental base. Experience also strengthens the relationship between facilitating conditions and the use of a platform because individuals find different ways of helping and supporting themselves over time to become familiar with the system and thus remove obstacles to sustainable use (Venkatesh et al. 2003). This refers to the e-learning resources to which crowd members have access (Amazon.com 2019) and the variety of self-organized online communities.

Concerning age and gender the available evidence is mixed. Miller et al. (2017) found no significant influence of age on the willingness to work and Serafini et al. (2018) reported that younger people are more likely to work as crowdshippers. The results are also mixed in terms of the influence of gender. On the one hand, Miller et al. (2017) reported that the likelihood of delivering a package is higher for males if it is an evening trip. On the other hand, Le and Ukkusuri (2018) found that women are more willing than men to divert their routes for longer distances and more time. Although recognizing some uncertainty because the literature is still in its infancy, we propose – mostly consistent with UTAUT – the following:

- RP10: The influence of performance expectancy on the intention to deliver will be moderated by gender and age such that it will be stronger for men, particularly younger men.
- RP11: The influence of delivery effort expectancy on the intention to deliver will be moderated by gender and age such that it will be stronger for women, particularly younger women.
- RP12: The influence of social influence on the intention to deliver will be moderated by gender, age, and experience such that it will be stronger for women, particularly older women in the early stages of experience.
- RP13: The influence of perceived platform support on crowd delivery participation will be moderated by age and experience such that it will be stronger for older workers, with more experience.

In addition to the moderators motivated by UTAUT, we are convinced that two more moderators must be considered based on the available research results, namely, mobility availability and time availability. Even with a strong intention to deliver products, it is necessary to be mobile. This may refer to a delivery vehicle (Le and Ukkusuri 2018, Ermagun and Stathopoulos 2018) or access to public transportation (Serafini et al. 2018). Furthermore, interested drivers must have sufficient time to make the deliveries (Paloheimo et al. 2016, Miller et al. 2017, Le and Ukkusuri 2018). For these reasons we postulate that:

- RP14: The influence of the intention to deliver on crowd delivery participation will be moderated by the availability of mobility and the availability of time such that it will be stronger for individuals with access to mobility and available time.

Figure 1 summarizes the derived research model.

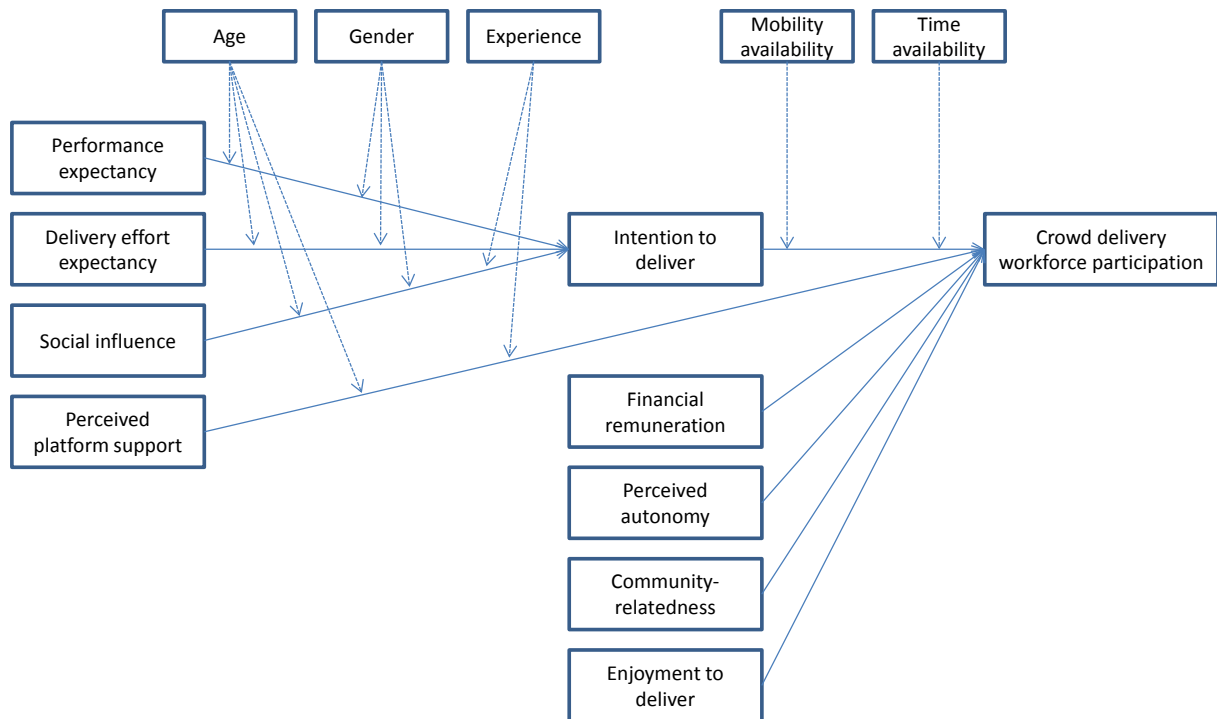


Figure 1. Crowd Delivery Workforce Participation Research Model

Summary, Implications and Outlook

Crowd delivery is an emerging phenomenon that is likely to become more important in the digital age ahead. Although people laughed at crowd delivery in the beginning, platforms such as Uber Eat, Postmates, and Amazon Flex are constantly expanding their businesses into new areas. A crucial aspect for the success of such platforms is workforce availability. In this paper, we theoretically synthesized the existing knowledge about the factors that influence participation in the crowd delivery workforce and developed a research model. This effort responds to the current lack of theorizing in the field of crowdsourcing.

Drawing on SDT, we argue that the performance of crowd deliveries is influenced by different types of motivation. By drawing on UTAUT, we take a more technological-oriented stance. We propose that the use of a crowd delivery platform depends on the perceived platform support and the intention to deliver. The intention is determined by performance expectancy, delivery effort expectancy, and social influence. Furthermore, we postulate the moderating influences of age, gender, experience, mobility availability and time availability.

This research has several theoretical implications. First, the literature review with only seven empirical contributions emphasizes the necessity for more empirical research to understand workforce participation in the specific context of crowd delivery. Second, theorizing participation in the crowd delivery workforce synthesizes the previously fragmented explorative results and calls attention to the inconsistencies in the available literature. Third, our research points to the influence of constructs that have not yet been considered and therefore expands the field of investigation. Based on the theoretical frameworks, we derived a comprehensive research model with a total of fourteen research propositions to stimulate further deductive-confirmatory empirical studies.

On the business side, this work gives practitioners a compact and clear overview of the current state of research concerning crowd delivery workforce participation. Further implications for business practice will arise in future studies that test the derived research propositions. Such work can provide platform providers with guidelines on the design of their services. Gaining such knowledge would be the cornerstone of a crowd delivery supply management strategy to ensure the availability of drivers and the functioning of the logistics system.

Research limitations exist regarding the theoretical framework selection. This paper only considers SDT and UTAUT, which are prominent but by no means the only theories to be considered. It could therefore be useful to take other complementary theories into account. Moreover, it could be argued that the literature used to give substance to the theoretical relationships in the specific context of crowd delivery was limited. To substantiate the research propositions presented in this paper, it would be useful to conduct supplementary qualitative research that takes a detailed look at all stages of the driver journey, from being attracted to a crowd delivery platform to becoming a long-term and actively engaged user who might even recruit other people.

Drawing on the propositions of this theoretical paper, there are many future research opportunities. In the first step, it is necessary to clarify how the constructs will be measured in the crowd delivery context. Although some scales can be adopted and adapted from other SDT and UTAUT studies, other scales must be initially tested and validated. After deciding how to measure, a promising research stream could be comparative studies of workers on different platforms or in different regions to find the similarities and differences. This can be used to determine generic and situational factors that influence participation. In closing, we refer to Castillo et al. (2018), who conclude that: “The research potential for [crowd delivery] is both tremendous and timely” (p. 15). We agree and hope that this work provides the impetus for more theoretically grounded research to help platforms secure one of their strategic resources: the drivers.

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