Traffic & Transportation

Evaluating Barriers and Enablers of Willingness-To-Work as a Crowdshipper – A Comparison of Business-To-Business and Business-To-Customer Models from a Slovenian Perspective

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Original Scientific Paper
Submitted: 18 Oct 2024
Accepted: 23 Dec 2024

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Publisher:
Faculty of Transport and Traffic Sciences, University of Zagreb

ABSTRACT
Crowdshipping has garnered increasing interest due to its potential benefits for various stakeholders. However, despite challenges in attracting crowdshippers, limited research explores their preferences, including socio-demographic factors and the practical challenges providers face when testing or implementing crowdshipping. This study aims to identify key factors influencing willingness-to-work (WTW) among potential crowdshippers, both in general and within business-to-business (B2B) and business-to-customer (B2C) contexts. Based on the literature review, this paper identifies 19 barriers influencing WTW and develops 22 corresponding enablers to address these barriers. Using a survey of 432 participants from Slovenia, the overall significance of these factors without differentiating business models was first assessed. Then, chi-squared automatic interaction detection analysis was applied to predict WTW in B2B and B2C contexts, identifying variations across these models. The disclosure of a mobile number emerged as the most influential predictor in both settings. Other notable differences in enablers and barriers were observed depending on the business model. These findings emphasise the need to consider business models in future preference analyses and provide a foundation for targeted recruitment strategies for crowdshippers.

KEYWORDS
last-mile delivery; crowdshipper; willingness-to-work; barriers; enablers; business-to-business/customer.

1. INTRODUCTION

The rising demand for frequent deliveries and European Commission mandates for lower emissions have placed significant pressure on logistics providers, making last-mile delivery increasingly costly. Despite this, customers remain unwilling to pay more for enhanced services [1]. Furthermore, 76% of supply chain operators report a workforce shortage, with 61% describing the situation as critical [2]. Logistics operators are turning toward innovative solutions like crowdshipping to address these challenges [3].

Crowdshipping is a last-mile delivery solution where individuals, known as “crowdshippers”, integrate deliveries into their daily routines, such as commuting to work or school. Environmentally friendly options, like public transport, bicycles or walking are often preferred [4-8]. Although crowdshipping has gained attention, research remains underdeveloped [9, 10]. A critical challenge is the lack of knowledge regarding crowdshippers’ preferences, which are vital for forming a critical mass of participants (including both crowdshippers and users) [5, 7, 11]. This knowledge is crucial for successful crowdshipping implementation [5, 6, 10, 12-15].

Given that crowdshipping is a service dependent on volunteers [11], understanding crowdshippers' interests and offering appropriate services is crucial [16]. While surveys on crowdshipper preferences have increased, research still lacks a comprehensive representation of all potential groups, such as employees, students, the unemployed and retirees, even though these groups are heterogeneous [4, 15]. Few studies include all age groups [14, 16-22].

The heterogeneity of crowdshippers, including differences in employment status, age and transport preferences, underscores the varying needs and expectations across different groups. This diversity significantly affects participation and requires service designs that satisfy distinct crowdshipper profiles.

Research frequently examines crowdshipper preferences, but analyses are often limited to socio-demographic factors like gender, age, education and employment status, as well as a few practical aspects such as detour distance, remuneration, package size and payment methods.

Although remuneration is often cited as a key enabler in willingness-to-work (WTW) studies [13, 14, 22-26], it is equally important to consider underexplored factors such as privacy, regulation and other challenges. Addressing these issues, along with the practical challenges faced by crowdshipping providers and other stakeholders, will lead to a more complete understanding of WTW and, consequently, improve the recruitment of potential crowdshippers. As a study of [9] notes, the lack of attention to providers' needs has slowed the development of the field.

Taking a holistic approach that goes beyond remuneration, parcel size and detour distance will provide a more accurate and comprehensive understanding of the factors influencing crowdshippers. These insights will be crucial for future preferential analyses, integrating established factors with emerging ones identified as significant by the survey respondents.

Of the 21 studies on crowdshippers' preferences reviewed, only two [27] provide a detailed rationale for factor selection, using motivational theories as the foundation for WTW analyses. Conducting a preferential analysis based on factors relevant to crowdshippers' perspectives ensures accuracy and practical applicability. It aligns with real-world motivations, making the results more actionable for crowdshipping providers, in contrast, using arbitrary factors risks producing less meaningful insights that do not address crowdshippers' actual needs.

This article aims to identify key operational barriers that have not been previously analysed, affecting the WTW as a crowdshipper, through a literature review. Subsequently, using a survey methodology, this study will evaluate the significance of these factors and the potential enablers developed based on the identified barriers. This evaluation will consider both general aspects and specific contexts within business-to-business (B2B) and business-to-customer (B2C) models.

Recognising the importance of participatory planning, collaborative governance [17] and organisational understanding [9] for sustaining shared services, this article merges current knowledge of crowdshippers' preferences with the practical challenges faced by crowdshipping providers. Through a literature review, this integration achieved through a literature review will generate a comprehensive set of content-specific factors (barriers) that influence WTW as a crowdshipper. Based on the barriers enablers to address them were created independently; these enablers were not outputs of the literature review. Additionally, an online survey in Slovenia to identify which factors are most significant, particularly focusing on variations between B2B and B2C contexts will be conducted. This analysis will employ a multivariate chi-squared automatic interaction detection (CHAID) method, known for identifying the most important predictive features.

Research on crowdshipping is scarce in Central and Eastern Europe, as most studies focus on regions with well-established parcel distribution systems, such as the United States and Northern Europe [14, 23, 28]. Slovenia, as a case study, offers valuable insights from a region that has received less academic attention, contributing to a more diverse geographic understanding of crowdshipping. Slovenia's infrequent public transport and growing gig economy make it an ideal case for exploring how crowdshipping can fill gaps in traditional freight delivery. These conditions offer insights into how crowdshipping might thrive in regions facing similar challenges, contributing to a broader understanding across Central and Eastern Europe and beyond.

This study will also examine variations in incentives and barriers between B2B and B2C contexts. While few studies explore these differences [17, 23, 29], B2B deliveries often demand greater reliability and structured operations whereas B2C deliveries emphasise flexibility, customer experience and smaller shipments. Trust and relationship management also differ, with businesses prioritising reliability and individuals seeking convenience. By including both B2B and B2C approaches in a preferential analysis, this paper aims to capture these behavioural differences. The analysis will employ the CHAID method to identify the most important predictive features.

This study poses two key research questions (RQs) to address the identified gaps in crowdshipping research. Answering these questions is crucial for advancing both theoretical understanding and practical application in the field.

RQ1: What are the most significant barriers and enablers for WTW as a crowdshipper in Slovenia?

RQ2: How do the barriers and enablers of WTW as a crowdshipper vary between B2B and B2C contexts?

This paper offers key insights into factors that could be considered in future preferential analyses and the design of solutions for crowdshippers. These findings will, therefore, benefit Slovenian crowdshipping providers.

In addition to enriching the literature by examining practical factors affecting WTW, this paper emphasises the distinct dynamics between B2B and B2C contexts. Its insights aim to inspire further studies in other regions, offering cross-national perspectives that are essential for shaping global business strategies and policies.

The paper is structured as follows: Section 2 reviews the existing literature on WTW and crowdshipping, with particular attention to practical challenges. Section 3 outlines the methodology and presents key descriptive statistics. Section 4 discusses the results, focusing on Slovene crowdshippers' preferences in B2B and B2C contexts. Section 5 offers a detailed discussion of these findings. The paper concludes with final remarks, limitations and implications for future research.

2. LITERATURE REVIEWS

A literature review began by conducting a review on the barriers for WTW as a crowdshipper – referred to as barriers – to explore the "reasons against" becoming crowdshippers. This provided an overview of existing research, highlighted research gaps and identified socio-demographic and content-specific factors that hinder WTW – factors that are either applied in analyses or only mentioned and discussed within papers (Section 2.1).

Next, practical crowdshipping challenges that affect crowdshippers but have been under-researched or not researched at all, particularly in the context of preference analyses (Section 2.2) were identified. By comparing these practical challenges – including some specific to crowdshipping – with the barriers identified in a literature review on the barriers for WTW as a crowdshipper, a comprehensive collection of barriers (Section 2.3) was compiled. This comprehensive set served as a basis for articulating enablers aimed at overcoming these barriers. Both enablers and barriers were then incorporated into our quantitative analysis (Section 3).

2.1 A review of studies on the WTW as a crowdshipper

A narrative literature review to explore the potential and enablers influencing WTW as a crowdshipper was conducted. Although narrative reviews are flexible, a structured search strategy to ensure comprehensiveness was implemented. A review included studies published in English up to 15 November 2022. Google Scholar was selected as our primary database for its broad coverage. While it lacks some advanced search functionalities, it aggregates a wide range of academic sources, including those not indexed in other databases. The following keywords in the full text were searched: "crowd logistics" OR "crowdshipping" OR ("crowdsourcing" AND "delivery") OR "crowdsourced delivery" OR "willingness" OR "willingness to work".

After thoroughly reviewing these studies, socio-demographic and context-specific factors related to operational challenges in real-world crowdshipping implementations were summarised. These factors are detailed in *Table 1*, in the second column. In our analysis, we distinguished between factors actively examined in the studies and those merely mentioned (see table note for formatting details). This distinction allowed us to identify well-researched factors and highlight gaps in the literature that require further investigation.

Table 1 – Summary of studies exploring WTW as a crowdshipper

Reference	Factors analysed
[23]	*socio-demographic data not available*, risk and security of interaction with strangers, difficulties with using a service, legality conformance, remuneration, public support, environment support, trying something new, scheduling deliveries
[16]	*gender, age, race, household size, education, employment, income, relationship status*, **knowledge of crowdshipping**, trip purpose, time of day, day of week, travel time, remuneration, additional time, **working with others**
[14]	gender, age, race, marital status, number of children, number of people in the household, education, employment status, income, type of accommodation, car ownership, means of transport used, access time to transit station, smartphone, social media, number of social media used, remuneration, additional travelling time, **compensation due to loss and damage**, parcel weight, number of parcels
[29]	*gender, age, familiarity with crowdshipping*, package dimensions, remuneration, extra time for picking or delivering, **number of stops per delivery**, **being tracked**, **absence of a regular contract**, environmental benefits, **safety**, **delivering to known persons, trust**
[17]	*gender, age, education, professional status, income,* **parcel locker location**, remuneration, delivery booking, **bank credit modes**, legal issues, non-monetary compensation
[18-20]*	*age, gender, race, family structure, education, household ownership, income,* remuneration, additional travel time, **compensation due to damage**, parcel weight, **not having enough time**, don't want to be a crowdshipper, incentives, delivery to known persons, **lacking access to phone**, **not owning a personal vehicle**, safety, **concerns of accepting hazardous or illegal items**
[21]	*age, gender, race, family structure, education, household ownership, income,* maximum travel time tolerance, remuneration, parcel ownership, package damage, **mentoring and training crowdshippers**, **redelivery**, **efficient and effective platform**, parcel insurance and safety, the safety of the crowdshipper, **security of personal data**, **crowdshipper's rating**, labour regulations, working schedule
[30]	*age, gender, employment status, mode of transport*, sharing concept, package size, detour, detour time, enjoyment, sustainability, social motivation, economic benefit, reputation, awareness, mobility behaviour
[31]	age, gender, income, place of residence, place of work or study, travel start time, travel time, route, mode of transport, remuneration, parcel weight
[32]	content of the package, the weight of the package, time deviation, reimbursement, insurance in case of loss
[24]	*gender, age, education, annual income, mode of transport*, package size, package weight, remuneration, delivery time, delivery distance, frequency of delivery
[25]	*age, gender, occupation, education, number of children, household size, size of the city, the importance of carbon footprint*, remuneration, additional travel distance, dimension of parcel, concern of carrying hazardous or illegal goods, concern to damage or lose parcel, the responsibility for a parcel, not having time
[28]	*gender, age, employment status, education, income,* remuneration, additional travel time, weight, dimensions and number of parcels, environmental component
[33]	*age, gender, the average number of parcels per year*, compensation, delivery distance, location of shipments, security, working schedule, means of transport, legislation issues, rights and responsibilities of crowdshippers, the concern of carrying illegal goods, rating crowdshippers, privacy concerns, training and testing crowdshippers
[27]	*gender, age, education level, occupation, monthly family income, max amount used on online buying, travelling mode, detour*, perceived enjoyment, cost of participation, social interaction, remuneration, trust, experience, package size, detour, rights and responsibilities of crowdshippers, **easy access to technology-wise equipment**, training for crowdshippers
[22]	*gender, household type, age, education, commuting mode, e-shopping frequency, travel setting (direction, day, time),* remuneration, emissions saving, delivery location preference, additional travel time, package weight and size, **delivery deadline**
[34]	*age, income, mean of transport,* remuneration, number of parcels, additional travel distance, detour, CO_2 emissions

** Three papers of the same survey analysis.*

Note: Italicised text indicates actively examined socio-demographic factors. The normal text represents actively examined context-specific factors, including operational challenges. Grey-highlighted text denotes factors not subjected to in-depth analysis, merely mentioned in previous studies. ***Bold text*** *denotes seldom analysed or mentioned in passing rather than actively examined content-specific factors.*

A comprehensive review revealed that 17 of these studies extensively examined the influence of socio-demographic factors – such as age, gender, education, income, transport mode and professional status – on crowdshippers' WTW. Commonly studied context-specific factors included remuneration, additional travel time, detour distance, parcel weight, parcel dimensions, number of parcels and work schedule.

While previous studies have extensively examined socio-demographic and commonly studied context-specific factors, 19 important factors have been seldom analysed in depth and were only superficially mentioned in the literature. These factors – *potential barriers*, which are marked in bold in *Table 1* are presented and explained in *Figure 1.*

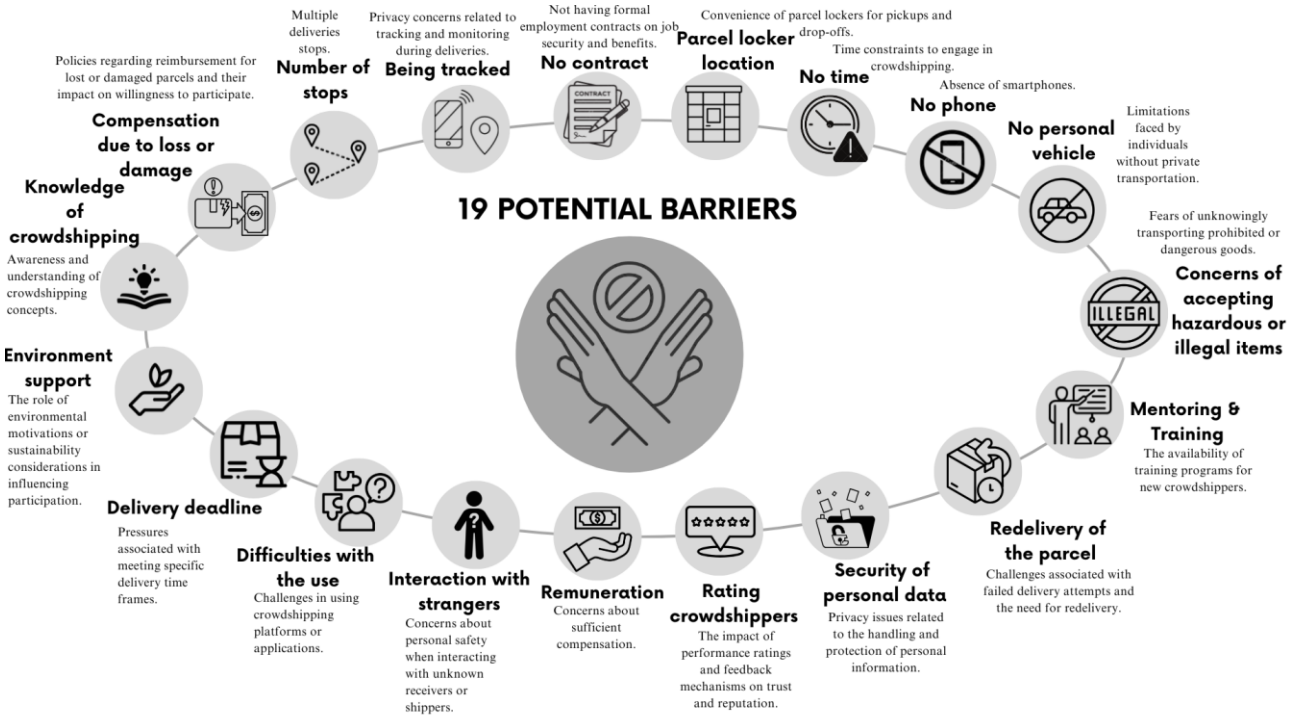

Figure 1 – Seldom analysed potential barriers of WTW as crowdshippers

While understanding crowdshipper preferences based on socio-demographic and operational factors explored in past studies is crucial – remuneration, for instance, was repeatedly identified as a key motivator for WTW by [13, 14, 22-25, 29] – it is equally important to consider the operational realities that are often overlooked**.** Many researchers have neglected the interplay between these socio-demographic factors and critical operational issues, despite these being repeatedly cited as concerns in crowdshipping. For example, a study of [10] identified a significant gap in the analysis of crucial factors affecting WTW, such as physical infrastructure (e.g. the use and location of parcel lockers), technological capabilities (e.g. the use of crowdshipping applications), professional training for crowdshippers and regulatory frameworks (e.g. loss or damage of parcels).

Furthermore, [5, 35] highlighted that legal regulation directly influences the potential risks in crowdshipping. For instance, labour law considerations can create complexities for gig workers, including crowdshippers. Additionally, a deeper analysis of safety and security issues is lacking. A study [36] pointed out that a major obstacle to successful crowdshipping applications is trust-building. The crowdshipper must trust that they are not delivering illegal products, which is closely related to the issue of data security and privacy. For example, crowdshippers are often required to share personal information, such as their mobile numbers, with strangers, which can raise significant privacy concerns [36]. A study of [9] further underscored the mismatches between practical challenges and existing scientific solutions, particularly in crowdshipper working conditions, security and privacy concerns, and infrastructure issues. They called for further exploration of these under-investigated factors.

A holistic approach encompassing a broader range of factors – not just remuneration, parcel size and detour distance – will provide a more accurate and reliable understanding of the factors hindering and motivating WTW on crowdshippers.

Only six studies encompassed all groups of crowdshippers (employees, students, unemployed and pensioners) [14, 16-22], despite [10, 18] arguing that these groups' needs might differ due to their varying experiences, digitalisation knowledge, time availability, physical limitations, income needs, risk tolerance, resource access and regulatory issues. Therefore, considering these differences could be important when designing or evaluating crowdshipping services.

Additionally, just three researchers specified the business model type ((B2B) or (B2C)) in their studies [17, 23, 33]. The B2B and B2C models present distinct operational challenges and dynamics, which could significantly influence crowdshippers' WTW. These models impact key factors like remuneration structure, time flexibility, customer interaction, parcel characteristics, safety concerns and operational complexity. Investigating these differences could provide valuable insights into how crowdshipping platforms should tailor their models to different crowdshipper segments, ultimately improving both recruitment and retention. Understanding these distinctions is crucial for designing crowdshipping systems that accommodate the unique needs and preferences of crowdshippers, ensuring that operational challenges and motivations are addressed in each model.

Most research has been conducted in Southern and Western Europe (Italy, Austria, the Netherlands, Slovakia, Poland, Finland), the USA and Asia. However, there is limited research on respondents from other parts of Europe [31].

A preferential analysis in Central and Eastern Europe would likely reveal different preferences and priorities among crowdshippers due to cultural and economic differences, technological infrastructure, geographical and urban differences, regulatory and institutional factors, consumer behaviour and attitudes, and social and demographic variability. Understanding how cultural, economic, infrastructural and regulatory differences shape the gig economy in these regions can provide valuable insights. These differences underline the importance of region-specific research to ensure that crowdshipping models meet local needs and challenges. Central and Eastern European countries could present new opportunities or challenges that are not as prominent in existing Western European or American-focused research.

2.2 A review of studies on operational challenges from the crowdshipping provider's perspective

Building upon the analysis of crowdshippers' preferences presented in Section 2.1, it is equally important to explore the challenges faced by those who facilitate these services (crowdshipping providers or crowdshipping platform owners). A study like [9] has underscored the mismatches between practical challenges and existing scientific solutions, particularly in areas such as crowdshipper working conditions, security and privacy concerns, and infrastructure issues. Similarly, a study like [17] highlighted the importance of participatory planning and collaborative governance for sustaining shared services, emphasising that a deeper organisational understanding is essential.

Recognising the importance of merging crowdshippers' preferences with practical challenges faced by providers, operational challenges encountered during practical implementation and pertinent to crowdshippers were examined. These challenges were extracted from three key studies: [9, 10, 21] *(Table 2)*. Notably, a study of [10] has already provided a comprehensive narrative literature review, analysing and discussing many current articles on the topic with in-depth precision. Given the thoroughness of their review, along with the in-depth examination of challenges by [21] and the practical insights from [9] their finding were synthesised to inform our analysis.

Investigating operational challenges from the provider's perspective will enhance this study's literature review by offering a more comprehensive understanding of the factors influencing crowdshipping dynamics. This approach may (1) uncover operational challenges that are not immediately apparent from the crowdshippers' viewpoint, (2) enable a more robust analysis of what hinders or motivates participation in crowdshipping and (3) align academic research with industry practices. Such alignment can increase the practical relevance of this study and its applicability in real-world scenarios.

Table 2 – Identified practical challenges in crowdshipping from recent publications

Reference	Practical challenges
[21]	hazardous or illegal products, rating of crowdshippers, insurance of delivery with a credit card, sharing personal info, lack of knowledge on crowdshipping, working schedules, redelivery of parcel
[10]	lack of basic labour protection, expensive insurance, **payment of parking spaces**, heavy packages, safety and security of crowdshippers and parcels (accidents, dangerous behaviour of receiver/sender), privacy concerns – sharing personal info, insurance of delivery with a credit card, rating of crowdshippers, direct communication with sender/receiver, hazardous or illegal products, owning a cell phone, **familiarity with working with apps and parcel lockers**, receiver absence, delivery to parcel lockers
[9]	absence of robust compensation, unprofessional/untrained crowdshippers, complex logistics activities to be handled by untrained crowdshippers, lack of parcel lockers, **lack of dedicated high-occupancy vehicle lanes**, **insufficient trust-generating mechanism**, **personal and cultural factors**, work schedule, illegal or hazardous products, lack of contractual obligations, safety and security concerns, lack of legal frameworks

*Note: Normal text represents barriers common to both perspectives. **Bold text** denotes new operational challenges.*

Comparing the operational challenges identified from the crowdshipping provider's perspective *(Table 2)* with the factors influencing crowdshippers' WTW *(Table 1)* reveals several overlapping and new barriers.

Most barriers are common to both perspectives, indicating their significance: risk and security of interaction with strangers, concerns of accepting hazardous or illegal items, privacy concerns, mentoring and training of crowdshippers, work schedule constraints, lack of knowledge on crowdshipping, legal and regulatory issues, compensation due to loss and damage and absence of the regular contract.

Six operational challenges – *potential barriers* were found to be new *(Figure 2).*

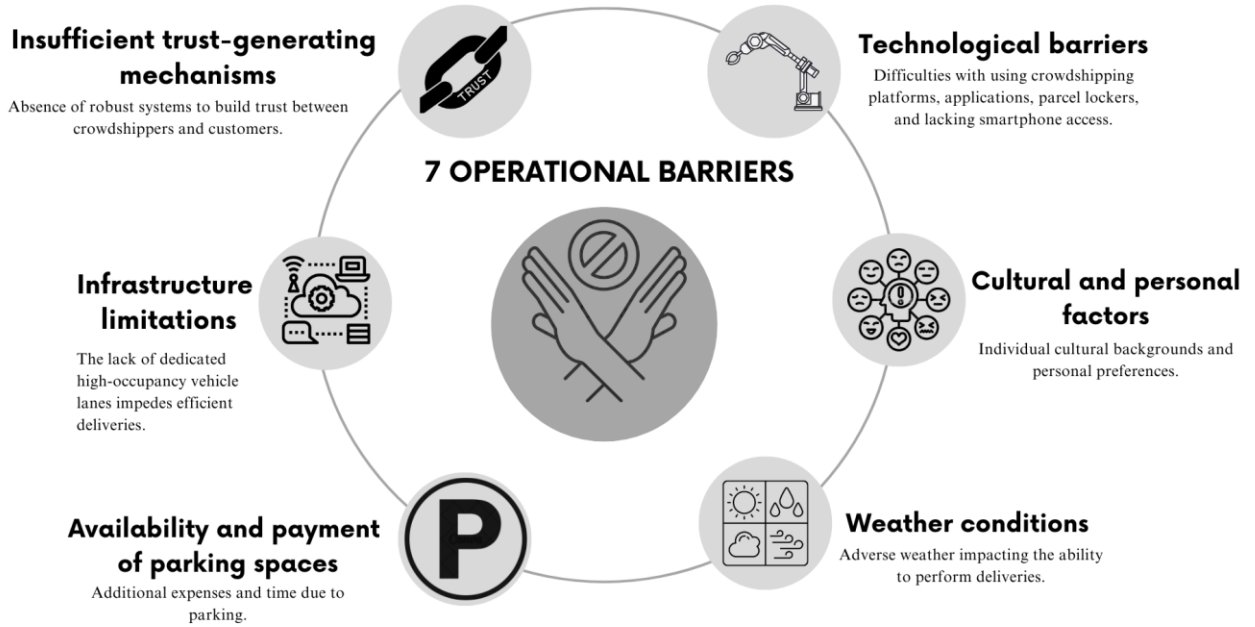

Figure 2 – Operational challenges from the crowdshipping provider's perspective

2.3 Refinement and expansion of barrier statements and development of enabler statements

The initial literature review identified 19 barriers (refer to Section 2.1). We then added 7 additional barriers from a subsequent literature review (see Section 2.2), resulting in a final list of 26 barriers for our survey. A systematic comparison using thematic analysis to consolidate similar barriers effectively was then conducted. For instance, "redelivery of the parcel" was merged with "receiver absence" since redelivery typically occurs due to the receiver not being present. Likewise, the barrier "insufficient trust-generating mechanisms" can be integrated with related barriers such as "security of personal data", "being tracked during delivery" and "interaction with strangers".

Barriers deemed irrelevant to the Slovenian context, like "the absence of dedicated high-occupancy vehicle lanes", which are not present in Slovenia, were omitted from our target list but may be pertinent in other regions. "Weather condition" as a barrier was also excluded because it is only occasionally impactful and does not consistently affect crowdshipping operations.

Certain barriers, such as "trust mechanisms", were not assigned separate barrier statements because they are effectively addressed through multiple enabler statements (E1, E5, E14, E15). Additionally, "cultural and personal factors" were excluded from barrier statements, as they are more appropriately analysed using preferential analysis methods.

However, barriers identified as significant in both literature reviews were included in the final set *(Table 3, 1st column)*. The exclusion criteria were based on relevance to the local context. Apart from these specific exclusions and consolidations, any further reductions to the list of barriers were made. Given that this is the first study on this topic in the Slovenian context, the authors aimed to include all barriers identified in the literature to comprehensively evaluate their importance. This approach allows us to determine which barriers are most significant, and these can later be used in preferential analyses to develop targeted strategies for promoting crowdshipping participation.

Only socio-demographic factors were excluded from the barrier list, as they have already been extensively researched. These factors can be combined with significant barriers identified in the current study in future preferential analyses to provide a more holistic understanding of the determinants influencing individuals' willingness to become crowdshippers.

In developing our survey instrument, barriers to crowdshipping participation were identified through an extensive review of existing literature. However, many of these barriers were broad and lacked the specificity necessary to capture the nuanced challenges faced by individuals unfamiliar with crowdshipping. To enhance the clarity and relevance of our survey, more precise barrier statements were refined and developed *(Table 3, 2nd column)*. This approach ensured that each statement was clearly understood by respondents, facilitating accurate and meaningful data collection.

Corresponding enabler statements were formulated for each identified barrier that proposes potential solutions or positive influences to mitigate these barriers. For example, the barrier statement "unfamiliar with this type of delivery/pick-up" (B1) was addressed by the enabler statement "more info on my duties/rights" (E1) *(Table 3, 3rd column).* This approach ensures a direct linkage between challenges and their potential facilitators, enabling a more targeted analysis of the factors influencing crowdshipping participation.

Each statement is assigned a unique code (e.g. B1 for the statement related to a barrier, E1 for the statement related to the B1) *(Table 3).* While all barriers from the literature were considered, some were only addressed through enabler statements in the survey as shown in *Table 3 (last row).*

Table 3 – Evaluation statements for barrier based on literature review

Barrier from literature	Statement for evaluation – barrier (B)	Statement for evaluation – enabler (E)
Knowledge of crowdshipping/Mentoring and training of crowdshippers	Unfamiliar with this type of delivery/pick-up. — B1	More info on my duties/rights. — E1
Not having enough time	Lack of time. — B3	Parcel delivery near daily activity. — E2 Delivery to parcel lockers or designated points. — E6
Lacking access to phone	No mobile phone. — B4	Adequate mobile phone usage guidance for parcel handling. — E7
Not owning a personal vehicle	No private car or means of transport. — B5	Ownership of means of transport for delivery. — E10
Difficulties with using a service	Unfamiliarity with crowdshipping platform. — B6	Use of a crowdshipping platform for parcel scheduling. — E9 Instructions for collecting/delivering from parcel lockers. — E8
Shipment inconvenience	Shipment inconvenience during transportation. — B7	Delivery is limited to smaller parcels. — E11

Barrier from literature	Statement for evaluation – barrier (B)	Statement for evaluation – enabler (E)
Risk of interaction with strangers	Discomfort in contacting strangers. — B8	No delivery for strangers only for acquaintances. — E5
Security of personal data	Concerns about personal information security. — B9	Guaranteed security of personal information. — E14
Sharing a mobile phone number	Reluctance to share mobile phone numbers with strangers. — B10	Non-disclosure of a mobile phone number to the recipient/sender. — E16
Being tracked	A desire for privacy from recipient/sender tracking. — B11	Concealed identity for privacy. — E15
Rating of a crowdshipper	Discomfort with recipient/sender evaluating service quality. — B12	The inability of the recipient/sender to assess service quality. — E17
Compensation due to loss or damage	Fear of parcel damage/loss/theft. — B15 Reluctance to insure parcel with a bank card. — B13	Adequate insurance against damage/theft/loss. — E21 No need for insurance with a credit card or other means. — E18
Risk in payment Environment support	Low remuneration. — B14	Non-financial payment options (free parking. public transport discounts). — E13
Concerns about accepting illegal/dangerous items	Fear of unknowingly handling illegal/dangerous products. — B16	Awareness of shipment contents. — E20
Delivery deadline	Worries about timely delivery. — B17	Reasonable time limit for parcel delivery. — E4 Early information on potential delivery. — E5
Redelivery of the parcel	Unwillingness to re-deliver if recipient/sender is absent. — B18 Reluctance to change delivery/pick-up location if recipient/sender is absent. — B19	Assured the presence of the recipient/sender at the delivery address. — E12
Number of stops per delivery		Ability to deliver multiple parcels in a day. — E22

Note: B=barrier, E=enabler.

3. METHODOLOGY

A two-stage process was developed to better understand the factors that either discourage or encourage various population segments to participate as last-mile crowdshippers. Firstly, barriers were identified through narrative reviews of scientific studies on WTW as crowdshippers, as well as practical challenges faced by crowdshipping providers during implementation (see Section 2.3). Secondly, we conducted an online survey to evaluate the interest in last-mile crowdshipping, intention to become a crowdshipper and to assess the significance of the barriers and enablers statements identified in Section 2.3 among different groups of potential crowdshippers: employed individuals, students, the unemployed and retirees. Finally, CHAID analysis was conducted to identify significant predictors of the intention to become a crowdshipper in the B2B and B2C contexts.

3.1 Survey methodology

A convenience sampling approach was employed due to time, budget and logistical constraints. The method is convenient and cost-effective, but it comes with the trade-off of potential sampling bias and limited generalisability of results. Efforts were made to reach a diverse population across various demographic segments, to mitigate these effects. Nevertheless, further research employing probability sampling methods is recommended to validate these results.

Participants aged 15 and above, living in Slovenia, were recruited through multiple channels to maximise diversity and reach within the target population. The survey was initially distributed via email to colleagues and professional contacts, who were encouraged to forward it to their networks. Student offices from several faculties shared the survey through students' emails and official social media groups. Slovene logistics associations circulated the invitation among their members. Employment agencies and retiree associations distributed the survey to their mailing lists.

The survey questionnaire consists of 25 questions, divided into four sections. The first section includes five closed-ended questions (multiple choice) designed to explore respondents' online shopping habits. The second section features six closed-ended questions – five multiple-choice questions and one open-ended question where respondents provide the name of a city. This section aims to gather information about respondents' travel habits. The third section, which is the main focus of the survey, examines WTW as a crowdshipper and explores the perception of various barriers and enablers identified in the literature. It contains six closed-ended questions – three multiple-choice and three using a 5-point Likert scale. The final section gathers demographic data with eight closed-ended questions (one value-based question and seven multiple-choice questions).

The questionnaire was developed based on existing literature (see Section 2). Pilot testing with representatives from each target group led to minor revisions for clarity.

The survey was conducted from November 2022 to March 2023 using a well-known and far-reaching online survey platform. The survey remained open for four months to maximise participation. Out of 1,253 responses, 821 were excluded due to incompleteness or incorrect responses, resulting in a final dataset of 432 participants. A sample size of 432 is considered adequate for exploratory research and allows for consistent inferences.

Although the sample was obtained through convenience sampling, which may limit generalisability, the size exceeds the threshold of 385 required for a 95% confidence level with a 5% margin of error in random sampling. This enhances the study's credibility while acknowledging the limitations inherent in the sampling method.

Descriptive statistics were computed using the IBM Statistical Package for the Social Sciences (SPSS) Version 26.

Socio-demographic data and descriptive statistics

An overview of the socio-demographic data is provided in *Table* 4. The gender distribution among respondents is relatively balanced, with 48.8% male and 51.2% female. This balance helps ensure that both perspectives are adequately represented in the analysis.

Table 4 – Socio-demographic characteristics of respondents

Characteristic	f	F [%]	Characteristic	f	F [%]
Gender			**Employment in logistics**		
Male	142	48.8	Yes	140	48.6
Female	145	51.2	No	148	51.4
Employment status			**Monthly income**		
Retired	38	13.1	No income	31	11.3
Employed	127	43.6	Less than 1,000 €	93	33.9
Unemployed	12	4.1	Between 1,001 and 2,000 €	94	34.3
Student	122	42.1	2,001 € and more	56	20.4
Highest level of education			**Online shopping frequency**		
Elementary school or less	31	10.7	Weekly	36	8.3
Vocation or high school	109	37.7	Monthly	162	37.5
College or university degree	95	32.9	Yearly	192	44.4
Postgraduate degree	54	18.7	Never	42	9.7

In the following *Figure 3*, the dependent variables used in our CHAID analysis are presented. About one-third of respondents are inclined to WTW in B2C (33.2% of them) and B2B (30.2% of them). The smallest portion of them (less than 10%) is very inclined to work as a crowdshipper. Remarkably, an equal proportion of respondents (40%) express favorability towards both B2B and B2C deliveries.

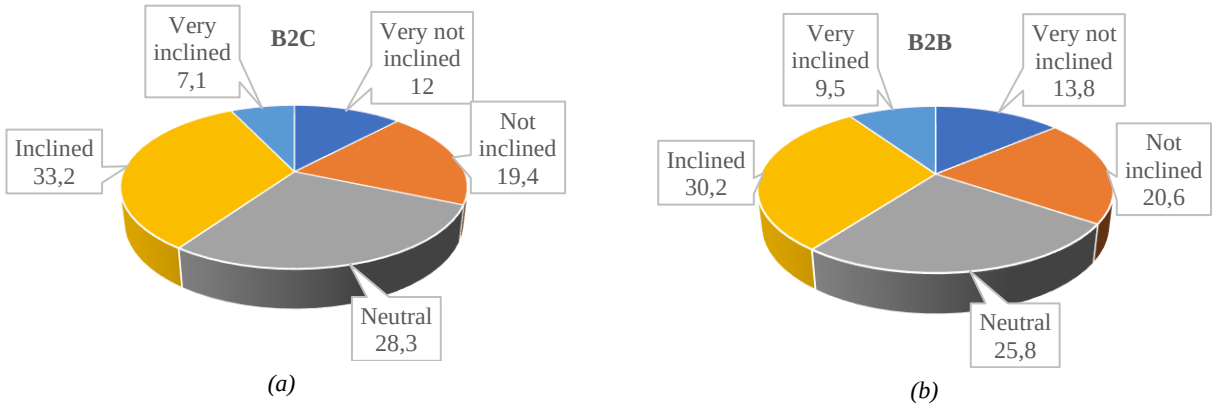

Figure 3 – a) Willingness to WTW in B2C; b) Willingness to WTW in B2B

In the subsequent section, the significance of barriers and enablers influencing individuals' decision to become crowdshippers – *results answering the RQ1* were explored. Respondents rated their level of agreement with various barrier and enablers statements *(Table 3)* using a 5-point Likert-type scale (1 – strongly does not apply, 5 – strongly applies). Descriptive statistics of these barriers are presented in *Table 6*.

Table 6 – Descriptive statistics of barriers and enablers to becoming a crowdshipper

Barriers	N		Mean	Median	Std. Deviation	Enablers	N		Mean	Median	Std. deviation
	Valid	Missing					Valid	Missing			
B1	326	106	3.17	3.00	1.206	E1	292	140	3.17	3.00	1.266
B2	326	106	2.12	2.00	1.070	E2	292	140	3.47	4.00	1.236
B3	326	106	3.39	3.00	1.178	E3	292	140	3.53	4.00	1.253
B4	326	106	1.21	1.00	.741	E4	292	140	3.28	3.00	1.208
B5	326	106	1.62	1.00	1.159	E5	292	140	3.09	3.00	1.215
B6	326	106	2.60	2.00	1.329	E6	292	140	3.10	3.00	1.209
B7	326	106	2.51	2.00	1.081	E7	292	140	2.90	3.00	1.264
B8	326	106	2.44	2.00	1.198	E8	292	140	3.23	3.00	1.230
B9	326	106	2.84	3.00	1.308	E9	292	140	3.23	3.00	1.231
B10	326	106	3.26	3.00	1.317	E10	292	140	2.95	3.00	1.411
B11	326	106	3.52	4.00	1.324	E11	292	140	3.22	3.00	1.233
B12	326	106	2.77	3.00	1.333	E12	292	140	3.55	4.00	1.213
B13	326	106	3.60	4.00	1.320	E13	292	140	2.26	2.00	1.240
B14	326	106	2.92	3.00	1.231	E14	292	140	3.60	4.00	1.316
B15	326	106	3.14	3.00	1.288	E15	292	140	3.52	4.00	1.278
B16	326	106	3.24	3.00	1.255	E16	292	140	3.37	3.00	1.284
B17	326	106	2.84	3.00	1.204	E17	292	140	2.91	3.00	1.188
B18	326	106	3.62	4.00	1.196	E18	292	140	3.63	4.00	1.319
B19	326	106	3.48	4.00	1.262	E19	292	140	3.50	4.00	1.248
						E20	292	140	3.20	3.00	1.273
						E21	292	140	3.76	4.00	1.288
						E22	292	140	3.14	3.00	1.161

On average, respondents disagree that they are not inclined to become crowdshippers because they do not have a mobile phone (M = 1.21; SD = 0.74), lack a private car or other means of transportation (M = 1.62; SD = 1.16) and do not support this type of delivery (M = 2.12; SD = 1.07) *(Table 6)*. Conversely, respondents agree that they are inclined to become crowdshippers because of the unwillingness to re-deliver if the recipient or sender is absent (M =3.62; SD = 1.2), low remuneration (M = 3.6; SD = 1.32) and discomfort with being evaluated on service quality by the recipient or sender (M = 3.52; SD = 1.32) *(Table 6).* For all other barriers, respondents, on average, express neutral opinions.

Table 6 also shows that respondents would be mostly motivated to become crowdshippers if adequate insurance against damage, theft, or loss were provided (M = 3.76; SD = 1.29) and if there were no requirements for a credit card or other means of insurance (M = 3.63; SD = 1.32). The least motivating enabler is the provision of non-financial benefits, such as free parking or public transport discounts (M = 2.26, SD = 1.24). In all other cases, respondents are, on average, neutral towards the enablers.

3.2 CHAID analysis

This study employed a CHAID analysis to classify the data and to create predictive models that segment the population and identified barriers/enablers influencing the likelihood of WTW as a crowdshipper in B2B versus B2C contexts.

CHAID was selected over traditional regression analysis due to its ability to handle categorical dependent variables and uncover complex interactions between multiple independent variables. Regression analysis often assumes linear relationships and may not effectively model interactions or hierarchical structures within categorical data. In contrast, CHAID can explore non-linear patterns and segment the population into homogeneous subgroups, providing deeper insights into the factors influencing WTW.

The primary advantage of CHAID analysis is that it is a non-parametric method, meaning it does not rely on assumptions about data distribution. By using chi-square statistics for nominal dependent variables, CHAID constructs decision trees with multiple combinations and splits based on significance thresholds (p-value < 0.05) [37, 38]. This method produces visual, easy-to-interpret results – a nonbinary tree with branches representing predictor variables and distinguishing between different respondent groups [37, 39]. CHAID uses both Chi-square and F-tests to identify statistically significant differences, with bootstrapping methods applied in both cases to enhance reliability.

The CHAID analysis splits the whole dataset into homogenous subgroups based on the interaction between the dependent variable and independent variables. The technique only has one dependent variable and several independent variables for making the classification. There are three types of nodes: root, parent, and child nodes. The root node is located at the top of the tree. The parent node is a node that is further split into subgroups. The child nodes are the resulting subgroups of a parent node. Child nodes that are not split further are called terminal nodes [37].

Dependent and independent variables

Inclination to WTW under the B2B and B2C model was inserted as a *dependent variable*, while respondents' socio-demographic status (age, gender, employment status, the highest level of education, monthly income, employment in logistics and frequency of online shopping) and all enablers/barriers *(detailed in Table 3, 2nd and 3rd columns)* to become a crowdshipper, were inserted as *independent variables*.

Procedure of CHAID analysis

All variables were coded appropriately, with categorical variables assigned numeric and alphabetic code (e.g. B1 for the 1st barriers and E1 for the 1st enabler *(see Table 3, 2nd and 3rd columns).* A chi-square test was used with a significance level (alpha) set at 0.05 for splitting nodes. The algorithm evaluated all independent variables to determine which had the strongest association with the dependent variable. The variable with the lowest p-value was selected for splitting the node.

It should be noted that all 5-point Likert-scale variables were recoded into 3-point variables: 1 indicating "does not apply" or "does not agree", 2 indicating "neutral", and 3 indicating "applies" or "agrees with the statement". This recoding was performed to simplify the analysis and to ensure sufficient data within each category for statistical reliability.

4. RESULTS OF CHAID ANALYSIS

In the following, *results answering the RQ2* are presented. A CHAID analysis was conducted to highlight enablers and barriers predicting WTW in B2B and B2C contexts.

4.1 Enablers predicting WTW in B2B context

In this part of the paper, this paper investigates the enablers for WTW in the B2B setting. The decision tree classifies respondents' WTW in the B2B context into five end nodes *(Figure 4).*

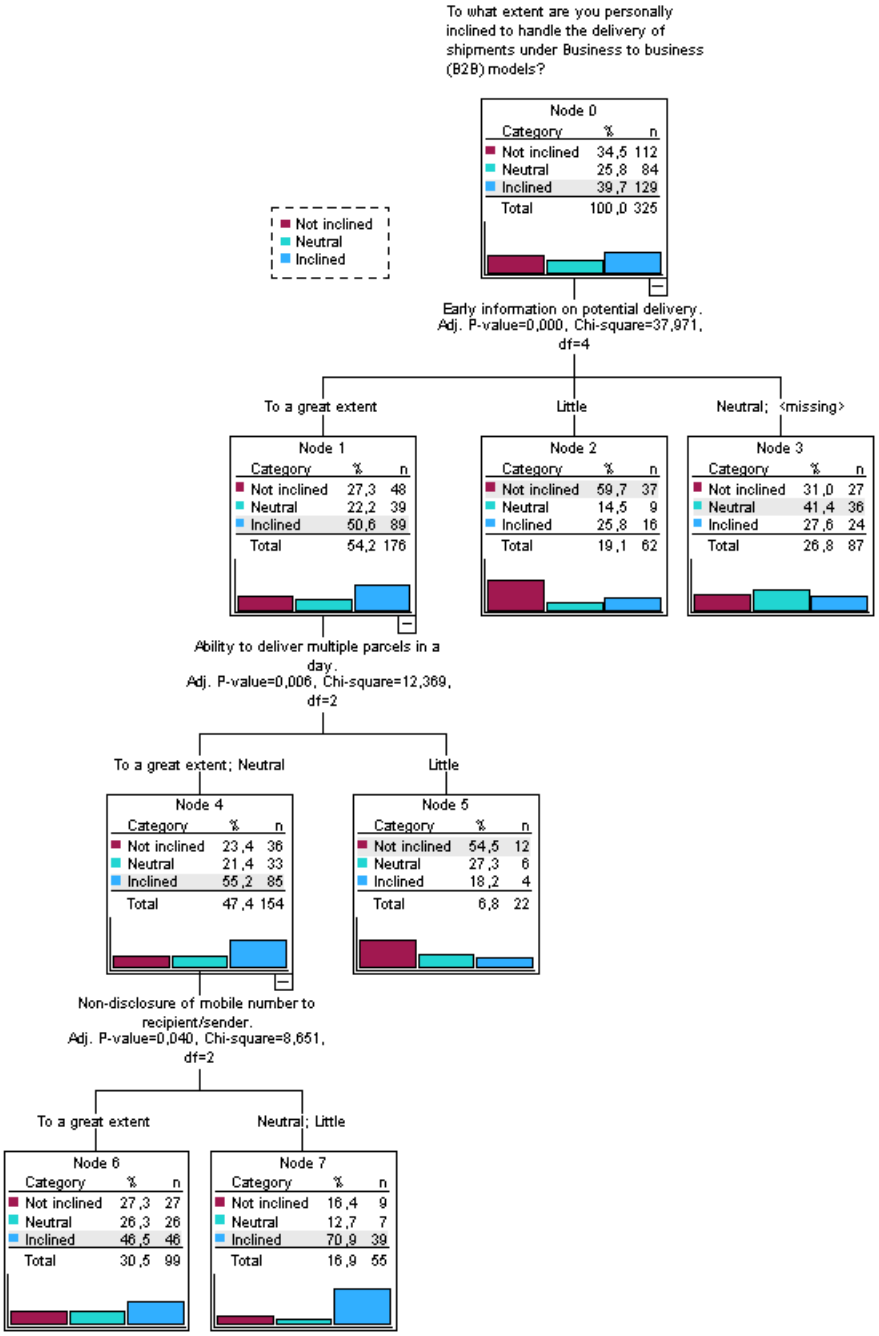

Figure 4 – Enablers to becoming a crowdshipper in the B2B model

Intriguingly, the early information on potential delivery (E3), the ability to deliver multiple parcels in a day (E22) and non-disclosure of the mobile number to the recipient or sender (E16), emerge as the most important enabler, significantly predicting WTW in the B2B context *(Figure 4).*

The decision tree correctly classified 52.3% of all respondents. Those who are inclined to become crowdshippers under the B2B model can be found in two clusters.

In the first cluster, there are 55 respondents. Out of them, 70.9% are inclined to become crowdshippers according to the B2B model. They are neutral or with a little motivation to become crowdshippers because of the non-disclosure of the telephone number (E16), they would like or are neutral towards the ability to deliver multiple parcels in a day (E22), and would like to receive early information on a potential delivery (E3) *(Figure 4).*

In the second cluster, there are 99 respondents. 46 or 46.5% of them are inclined to become crowdshippers according to the B2B model. They value to a great extent the non-disclosure of the telephone number (E16), they would like or a neutral towards the ability to deliver multiple parcels in a day (E22), and would like to receive early information on a potential delivery (E3) *(Figure 4).*

4.2 Enablers predicting WTW in B2C context

The following outlines the enablers for becoming a crowdshipper within the B2C model. The algorithm correctly classified 53.5% of respondents *(Figure 5).*

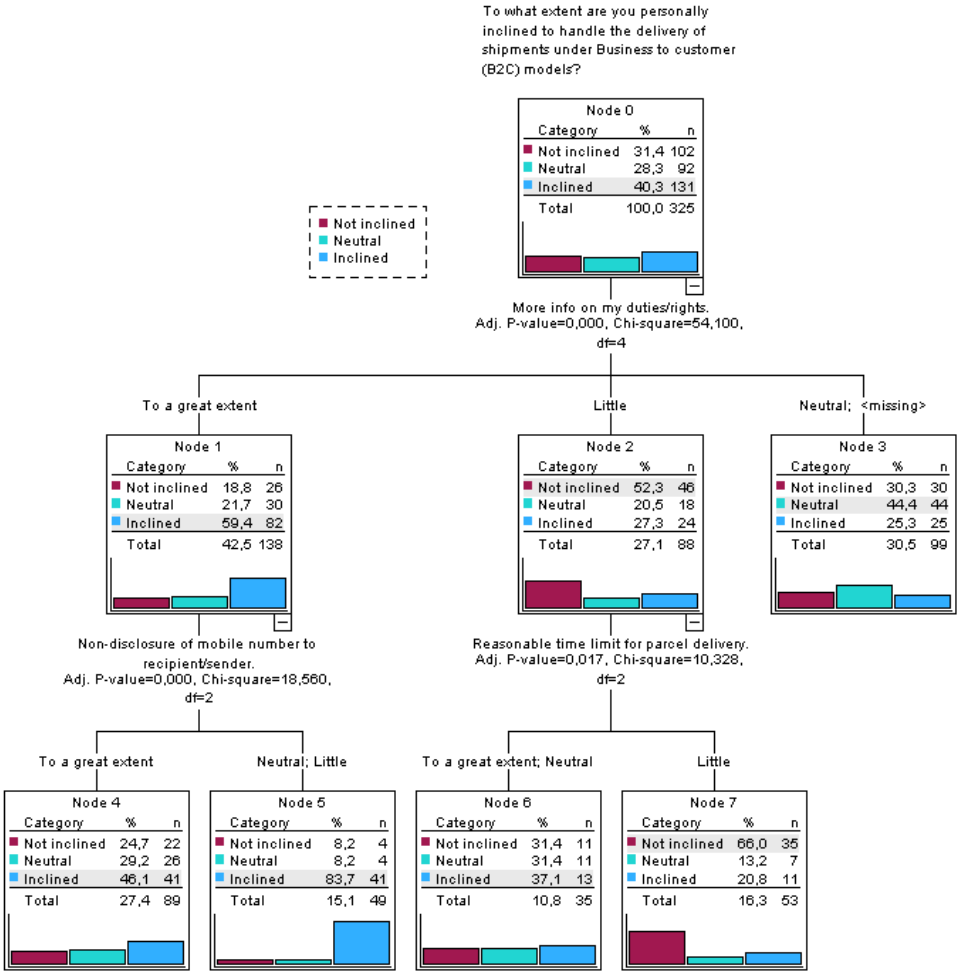

Figure 5 – Enablers to becoming a crowdshipper in the B2C model

The following enablers to become crowdshippers and sociodemographic characteristics of respondents define their inclination to become crowdshippers: more information on their duties and rights (E1), non-disclosure of mobile number to sender or recipient (E16) and reasonable time limit for parcel delivery (E4) *(Figure 5)*.

Those inclined to become crowdshippers according to the B2C model can be found in 3 final nodes. In the first group, there are 49 respondents; 41 or 83.7% of them are inclined towards becoming crowdshippers according to the B2C model. They are neutral or it presents for them little motivation the non-disclosure of mobile number to the sender or recipient (E16), and they would like to receive more information on their duties and rights (E1) *(Figure 5)*.

In the second group, there are 89 respondents. 41 or 46.1% of them are inclined towards becoming crowdshippers according to the B2C model. They are inclined towards the non-disclosure of mobile numbers

to the sender or recipient (E16), and they would like to receive more information on their duties and rights (E1) *(Figure 5).*

In the third group, there are 35 respondents; 13 or 37.1% of them are inclined to become crowdshippers according to the B2C model. They are neutral or it presents them great motivation for the reasonable time limit for a parcel delivery (E4), but more info on their duties and rights presents them little motivation (E1) *(Figure 5).*

4.3 Barriers predicting WTW in B2B context

Below are the barriers to becoming crowdshippers under the B2B model. CHAID analysis correctly classified 54.5% of respondents. There are six final nodes in this model *(Figure 6).*

The barriers that significantly differentiate respondents are shipment inconveniences during transportation (B7), unfamiliarity with the crowdshipping platform (B6), discomfort in contacting strangers (B8), and low remuneration (B14) *(Figure 6).*

Respondents inclined to become crowdshippers can be found in two nodes. In the first cluster, there are 112 respondents. 70 or 62.5% of them are inclined to become crowdshippers according to the B2B model. They do not feel discomfort in contacting strangers (B8) and are not concerned with shipment inconveniences during transportation (B7). In the second cluster, there are 50 respondents. 22 or 44% of them are inclined to become crowdshippers according to the B2B model. They are neutral or agree that they get low remuneration (B14), they agree or do not agree that they are unfamiliar with the crowdshipping platform (B6), and they are neutral towards shipment inconveniences during transportation (B7), being the barriers for them *(Figure 6).*

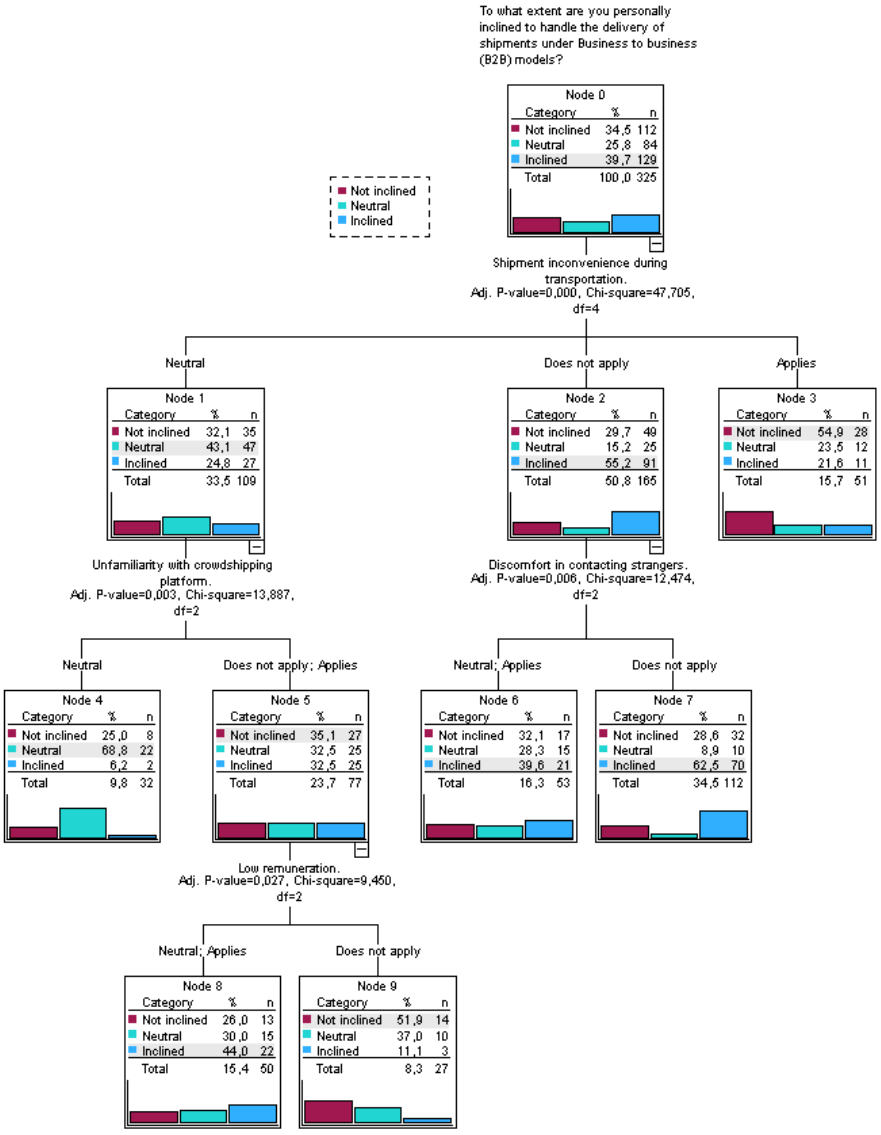

Figure 6 – Barriers to becoming a crowdshipper in the B2B model

4.4 Barriers predicting WTW in B2C context

The following outlines the barriers to becoming a crowdshipper within the B2C model. CHAID analysis correctly classified 52.6% of respondents *(Figure 7).*

The following barriers to WTW as crowdshippers according to the B2C model differentiate respondents: shipment inconvenience during transportation (B7), discomfort with recipient/sender evaluating service quality (B12), they do not support this type of delivery (B2), reluctance to share their mobile phone number with strangers (B10). Differences among respondents can be found also between those who are retired and those who are not retired *(Figure 7)*.

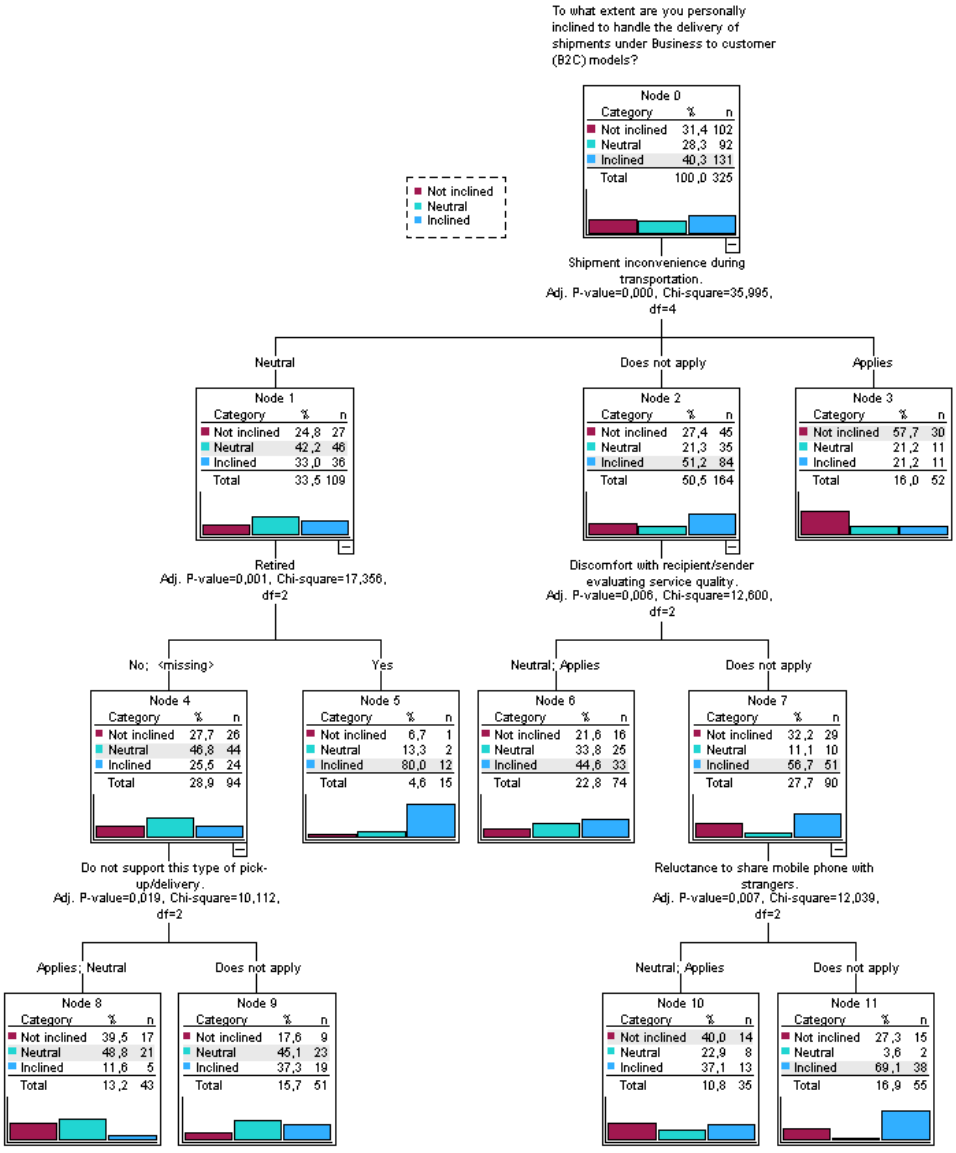

Figure 7 – Barriers to becoming a crowdshipper in the B2B model

Respondents inclined to become crowdshippers according to the B2C model can be found in 3 clusters. The first cluster is formed of 15 respondents; 12 or 80% of them are inclined to become crowdshippers. They are retired and neutral towards shipment inconvenience during transportation *(Figure 7).*

In the second cluster, there are 55 respondents. 38 or 69.1% of them are inclined to become crowdshippers according to the B2C model. They are not reluctant to share their mobile phone number with strangers (B10), do not find discomfort with the recipient or sender evaluating service quality (B12) and do not bother about shipment inconvenience during transportation (B7) *(Figure 7).*

In the third cluster, there are 74 respondents: 33 or 44.6% of them are inclined to become crowdshippers according to the B2C model. They are neutral or do find discomfort with the recipient or sender evaluating service quality (B12) and they do not bother about shipment inconvenience during transportation (B7) *(Figure 7).*

5. DISCUSSION

In addressing RQ2, the study found only minimal differences in WTW as a crowdshipper between the two business models, B2B and B2C. This contrasts with the findings of [23], which suggested a stronger inclination to engage in B2B deliveries, possibly due to the higher credibility associated with businesses compared to individuals. This finding is valuable for crowdshipping providers in Slovenia, as it shows that only minor adjustments in service design are needed for deliveries in B2B and B2C contexts. This not only reduces the complexity and costs associated with offering different service options but also enhances operational efficiency by enabling the use of a more standardised approach. Additionally, providers can better scale their operations, tapping into a broader pool of crowdshippers without needing to overly segment or specialise services, ultimately simplifying targeting and improving market reach.

The following paragraphs present *significant predictors* in one business model but not the other.

Sharing the mobile number (B10) was identified as a significant barrier to WTW *in the B2C but not B2B* context. Notably, [17] conducted the only known study indirectly addressing the impact of this enabler, finding that being tracked by mobile phones demotivated students in Rome from becoming crowdshippers. However, their study lacked differentiation between B2B and B2C contexts.

This presents a notable challenge for crowdshipping providers, as [17] also revealed that parcel recipients often expect to receive the deliverer's phone number to coordinate the exact delivery time or at least track the delivery progress, both of which typically require a smartphone. One potential solution is for crowdshippers to deliver parcels to parcel lockers or agreed pick-up locations rather than directly to recipients. While this option is popular and familiar among younger and middle-aged populations in Slovenia, older individuals may face difficulties using parcel lockers, especially in smaller villages where such infrastructure may be lacking, despite their availability in mid- and larger cities. Offering training or easy-to-use guides for older populations to familiarise themselves with parcel locker systems could also help bridge the gap in service accessibility.

Another approach could involve implementing alternative communication methods that respect privacy. For instance, crowdshipping platforms could introduce in-app messaging systems that allow coordination without using personal phone numbers. This would enable crowdshippers to maintain privacy while still providing recipients with a way to confirm delivery details.

While the enabler of *more information on my duties and rights (E1)* uniquely influences WTW *in the B2C model, early information on potential delivery (E3)* serves as a significant predictor of WTW exclusively *in the B2B context*. The first finding aligns with [33], who, despite not distinguishing B2B and B2C, share similar insights. Similarly, [18] found that greater familiarity with crowdshipping increases WTW, and [27] noted strong enthusiasm to become crowdshippers, despite low awareness of the delivery mode, without specifying B2B or B2C differences.

There are several reasons why well-defined guidelines concerning responsibilities and rights might have a greater impact on WTW in B2C. Unlike businesses with established logistics processes, individual consumers in B2C transactions might not be as familiar with delivery norms. They may not know what to expect from the crowdshipper or what their responsibilities are. Clear guidelines help understand their role, reducing potential conflicts and building trust as noted by [10]. Furthermore, B2C deliveries may present more risks, such as consumers expecting additional services. Besides, in B2B, the interaction is typically more professional, and standardised, with fewer uncertainties about what is expected. Well-defined guidelines minimise surprises. Moreover, better knowledge facilitates longer endurance in the profession, guarantees more workforce [27], and reduces stress for a crowdshipper [40].

The final significant predictor of WTW for certain individuals, *specifically in B2B but not B2C* scenarios, was *the ability to deliver multiple parcels in a day (E22)*. Aside from [30], who found that students in Rome were not willing to deliver more than five packages, few studies have examined these incentives. One possible explanation for the difference between B2B and B2C is that in B2B scenarios, individuals may perceive higher remuneration potential when delivering more parcels, as business transactions are often seen as more profitable. Additionally, there may be a perception that B2B deliveries come with fewer risks and greater predictability. However, they might be less flexible regarding working hours, whereas in B2C, parcels can be delivered at any time, including late in the evening or on weekends. Even more surprising, and harder to explain, is that *reasonable time limits for parcel delivery (E4)* were identified as a crucial motivational factor for WTW *in B2C, but not in B2B*. One might expect potential crowdshippers to prioritise reasonable time limits more in B2B, given the higher penalties involved. However, the demand for shorter lead times has decreased since COVID-19, and our results may reflect this shift. Further analysis is needed to confirm this assumption.

Below are highlighted predictors that were identified in one model but not both, and even in the model where they were found, they were not as significant as those mentioned in the previous paragraphs.

Low remuneration (B14) was found to have a neutral or negative impact on WTW as a crowdshipper in *the B2B context, but not in B2C*. This is an interesting insight, as remuneration has typically been identified as a significant motivator in several studies that did not differentiate between B2B and B2C [13, 14, 16, 17, 22, 23]. This finding suggests that potential crowdshippers may be more willing to accept lower pay for B2C deliveries, but not for B2B deliveries. This is also promising for institutions looking to test crowdshipping solutions for humanitarian purposes (e.g. for older citizens and people with special needs), where the expectation of no remuneration might be more acceptable.

Unfamiliarity with the crowdshipping platform (B6) was also found to be a predictor, but not a significant one, of WTW *in the B2B and not B2C context*. The significance barrier has never been tested in any of the past studies.

The following *insights pertain to RQ1*. Firstly, it is important to note that barrier *B2 – I don't support this delivery method* – holds little relevance in Slovenia, aligning with the findings of previous studies [13, 29, 31]. This suggests a significant interest in crowdshipping within the country, which is a positive indicator for parcel providers aiming to introduce such solutions.

Additionally, *not owning a mobile phone (B4)* or *lacking a private vehicle or other transport means (B5)* does not seem to hinder WTW as a crowdshipper. This likely reflects that most respondents possess either a phone or a private car, or are utilising alternative mobility options such as public transport, carpooling or cycling, which can also facilitate participation in crowdshipping. While past studies have not extensively examined the significance of mobile phone ownership – despite its necessity for accepting crowdshipping jobs, accessing parcel lockers and communicating with recipients – [18] found that some respondents without a car were still willing to work as crowdshippers.

Respondents also expressed *reluctance to redeliver parcels when the recipient is absent (B18)*, highlighting a challenge that needs to be addressed. This challenge requires an effective solution, as relying on recipients to be home is often unreliable – recipients may forget the delivery or be unavailable for other reasons. While parcel lockers could be an option, they are not always available in smaller villages, and some recipients are unfamiliar with or unwilling to use them. One alternative is to establish multiple drop-off locations, such as stores or petrol stations, which can serve as neighbourhood pickup points for recipients who miss a home delivery. Another option is the installation of smart parcel boxes outside recipients' homes, allowing secure, contactless delivery. A peer-to-peer delivery option, where a trusted neighbour or nearby crowdshipper collects and temporarily stores the parcel if the recipient is unavailable, offers a simple and flexible solution. Additionally, smart home technology, such as smart locks, could enable delivery personnel to securely leave parcels in indoor areas like porches or hallways. Introducing a small fee for repeat delivery attempts or providing incentives – such as discounts or rewards – for recipients available during the first delivery attempt may encourage more timely parcel receipt and further diminish redeliveries.

Discomfort with being evaluated on service quality by recipients or senders (B12) hinders the WTW as crowdshippers in Slovenia, which aligns with the findings in previous studies [9, 20]. However, such feedback is crucial for building a quality pool of crowdshippers and ultimately increasing the use of crowdshipping services. Providing clear information during the training process about the importance of evaluations for improving service quality could help crowdshippers understand the necessity of feedback. Framing evaluations as a tool for professional development rather than scrutiny may also ease concerns. Crowdshippers should also be allowed to evaluate senders and recipients, which would reduce the perception of one-sided judgement and create a more balanced system. Additionally, offering crowdshippers the option to choose whether or not they wish to participate in the evaluation process could further alleviate discomfort. Those who agree with the evaluation could receive benefits such as higher pay or more delivery opportunities.

Unsurprisingly, respondents are generally reluctant to become crowdshippers due to *low remuneration (B14)*, a finding consistent with previous studies [13, 20, 22-25, 29] which highlight profit as a key motivator. This underscores the need for a more comprehensive and in-depth stated choice analysis to evaluate the role of remuneration alongside other critical factors identified in this study and future research in Slovenia. To date, no similar study has been conducted in Slovenia.

This study identified two key interrelated enablers: adequate insurance against damage, theft, or loss (E21) and the absence of requirements for a credit card or other forms of insurance (E18). Respondents do not want to bear these costs, which is understandable. However, solutions in this area are still needed. For instance, [21] noted that some crowdshipping providers offer basic insurance and give customers the option to purchase

additional coverage if desired. Crowdshipping providers could share the cost of insuring parcels with customers. This reduces the burden on crowdshippers. A pay-per-parcel insurance option, where customers can choose to add insurance when booking a delivery might also solve the problem. This would ensure that only those sending valuable or fragile items bear the cost of additional insurance, while crowdshippers are not responsible for handling or paying for coverage. Another option can also be to set a liability limit for crowdshippers, where they are only responsible for damage or loss up to a minimal amount (or not at all). This would shift most of the responsibility to the crowdshipping provider or customer for insuring valuable parcels, reducing the pressure on the crowdshipper.

6. CONCLUSION

Crowdshipping providers face a significant challenge in attracting and retaining a sufficient number of crowdshippers, as many operate voluntarily. It is essential to understand their needs and develop solutions that align with those needs while also considering the interests of other stakeholders. However, many existing studies fail to align their preferential analyses with the practical requirements of crowdshipping providers, leaving these crucial aspects largely unexplored.

The current research integrates insights from the literature on crowdshipper challenges with real-world issues faced by crowdshipping providers to address this gap. A comprehensive list of 19 potential barriers that may inhibit WTW as a crowdshipper and 22 enablers that could address these barriers was identified. Using a sample of 432 potential crowdshippers in Slovenia, the significance of these factors was assessed and, by applying CHAID analysis, those factors that predict WTW in both B2B and B2C contexts were identified – a distinction not previously explored despite potential differences in these business models.

The following insights address RQ1 by identifying the most significant barriers and enablers in general. Overall, the most significant *enablers* for willingness to work (WTW) as crowdshippers are having adequate insurance coverage for damage, theft or loss (E21), and not needing to insure a delivery with a credit card or other payment methods (E18). On the other hand, the primary *barriers* impacting WTW among crowdshippers include concerns about being evaluated on service quality by recipients or senders (B12), low payment (B14) and the need for redelivery if the recipient or sender is unavailable (B19).

The differences in barriers and enablers predicting WTW as a crowdshipper in B2B versus B2C contexts were highlighted to address RQ2. In the *B2B* context, *barriers* such as unfamiliarity with the crowdshipping platform (B6), discomfort in contacting strangers (B8) and low remuneration (B14) are significant predictors of WTW as a crowdshipper. Conversely, in the *B2C* context, barriers like discomfort with being evaluated on service quality by recipients or senders (B12) and reluctance to share mobile phone numbers with strangers (B10) predict WTW.

Regarding *enablers*, in the *B2B* delivery context, early notification of potential deliveries (E3) and the ability to handle multiple parcels in a day (E22) emerge as significant factors encouraging WTW. Conversely, in the *B2C* context, enablers include providing more information on duties and rights (E1) and offering a reasonable time limit for parcel delivery (E4).

Notably, variations among respondents in B2B barriers also extend to differences between those who are retired and those who are not.

By providing a comprehensive list of actual and content-specific factors influencing WTW as crowdshippers – which can be adapted for evaluations in different geographical areas – our study makes several key *theoretical contributions*. The integration of operational factors enriches the theoretical understanding of crowdshipping by highlighting how practical, real-world challenges influence crowdshippers' decisions, not just their socio-demographic characteristics and a limited number of content-specific factors. Moreover, the set of barriers and enablers allows for the comparison of similarities and differences across geographical regions, which can help in the development of more universally applicable or region-specific business models. This comparative approach can contribute to theory by suggesting which factors are globally significant and which are context-dependent, therefore helping in the creation of adaptable theoretical frameworks for crowdshipping. Finally, by examining the impact and interrelationship of enablers and barriers in both B2B and B2C contexts – an aspect not previously explored – new theoretical insights into how different business models influence crowdshippers' enablers and barriers were provided.

The results provide managerial insights relevant to the Slovenian logistics industry, although they cannot be generalised beyond this context. The survey revealed that respondents are open to crowdshipping, a promising sign for providers in Slovenia where such services do not yet exist. Notably, approximately 40% of

individuals are willing to become crowdshippers in both B2B and B2C contexts. This suggests that the same individuals are open to delivering parcels in both settings, with only minor differences in perceived barriers and enablers.

By directing crowdshipping providers to focus on the most impactful barriers and enablers, our study helps them avoid unnecessary efforts on less relevant issues. This targeted approach enables crowdshipping providers in Slovenia to develop effective strategies without wasting time and resources. However, before addressing the most significant barriers, they should be included in a preference analysis alongside other relevant variables such as remuneration, detour distance, travel time and parcel dimensions to assess their importance.

Despite the valuable insights, this paper has certain limitations. Firstly, although an extensive narrative literature review was conducted, it was not a systematic review, which means there is a possibility that some relevant factors may have been overlooked. Additionally, this research was initiated at the end of 2022, but since then, new papers [36, 41-44] have emerged on the topic, and their insights are not included in this study.

Moreover, given the heterogeneous nature of crowdshippers, it would be valuable to examine the differences in significance among groups such as employers, students and retirees. This could provide even more insightful data for effectively targeting the appropriate crowdshippers.

An important limitation of this study is the substantial proportion of participants employed in the logistics sector (48.6%). This overrepresentation may have influenced the results, as individuals working in logistics are likely to possess greater knowledge about last-mile delivery processes and may be more receptive to the concept of crowdshipping than those without professional experience in the field. However, it is noteworthy that crowdshipping services do not currently operate in Slovenia, and awareness of this concept is generally low – even among logistics professionals – except students and academics specialising in last-mile delivery.

This study has focused on B2B and B2C business models but did not include customer-to-customer (C2C) services. In Slovenia, C2C is becoming an increasingly popular service, primarily facilitated through a local carpooling platform, as no dedicated platforms for this type of delivery currently exist. The costs for these services are often comparable to, or even higher than, traditional parcel delivery providers. However, unlike parcel distributors, carpooling participants do not assume responsibility for the goods they transport. This form of delivery could offer parcel distributors an opportunity to capture additional market share while potentially providing users with lower prices and reduced risks of damage, non-delivery or late delivery of packages.

ACKNOWLEDGEMENTS

During the preparation of this work, the authors used ChatGPT-3 to improve the readability and language of the manuscript. After using this tool, the authors reviewed and edited the content as needed and took full responsibility for the content of the published article.

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Patricija Bajec, Eva Podovšovnik

Ocena ovir in spodbud za pripravljenost opravljanja dela množičnega dostavljavca: primerjava modelov poslovanje med podjetji (B2B) in poslovanje podjetje–potrošnik (B2C) z vidika Slovenije

Množično dostavljanje (crowdshipping) je vzbudilo vse več zanimanja zaradi možnih koristi za različne deležnike. Kljub temu, da se ponudniki soočajo z izzivi pri privabljanju množičnih dostavljavcev, je raziskav, ki bi preučevale njihove preference – vključno s sociodemografskimi dejavniki in praktičnimi izzivi pri testiranju ali uvajanju množičnega dostavljanja –, še vedno malo. Namen te študije je prepoznati ključne dejavnike, ki vplivajo na pripravljenost za delo (WTW) med potencialnimi množičnimi dostavljavci, tako splošno kot v okviru modelov poslovanje med podjetji (B2B) in podjetje–potrošnik (B2C). Na podlagi pregleda literature je bilo identificiranih 19 ovir, ki vplivajo na WTW, ter razvitih 22 ustreznih spodbud za odpravljanje teh ovir. S pomočjo ankete, izvedene na vzorcu 432 udeležencev iz Slovenije, smo najprej ovrednotili pomen teh dejavnikov brez razlikovanja med poslovnima modeloma. Nato smo uporabili metodo Chi-Squared Automatic Interaction Detection za napovedovanje WTW v kontekstih B2B in B2C ter ugotovili razlike med obema modeloma. Razkritje mobilne telefonske številke se je v obeh primerih pokazalo kot najvplivnejši napovednik. Obenem so se pokazale tudi druge pomembne razlike v spodbudah in ovirah, odvisno od poslovnega modela. Ugotovitve poudarjajo potrebo po upoštevanju poslovnega modela v prihodnjih analizah preferenc in predstavljajo osnovo za bolj ciljno usmerjene strategije pridobivanja množičnih dostavljavcev.

Ključne beside:
dostava zadnje milje; množični dostavljalec; pripravljenost za delo; ovire; spodbude; poslovanje med podjetji; poslovanje podjetje - potrošnik