

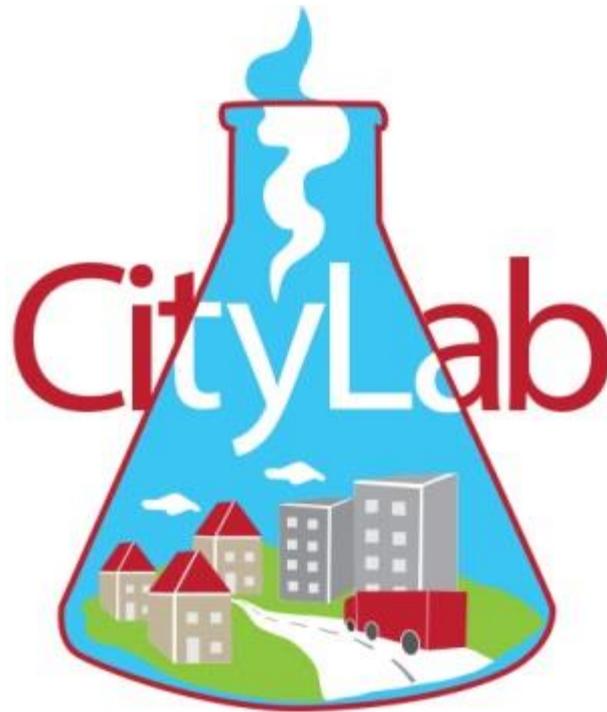
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Deliverable 5.5

Evaluation of the willingness to pay for the sustainable CITYLAB solutions

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Author(s)	Valerio Gatta, Edoardo Marcucci, Gian Cesare Romagnoli (Università degli studi Roma Tre)
Co-author(s)	
WP Leader	VUB
Internal Reviewer	Tariq Van Rooijen (TNO)

Project Manager	Andrea Arcelli (INEA)
------------------------	-----------------------

CITYLAB consortium by Living Lab			
Living Lab	Municipal partner(s)	Industry partner(s)	Research partner(s)
Brussels	Brussels Mobility	Procter & Gamble Services	Vrije Universiteit Brussel
London	Transport for London	TNT Gnewt Cargo	University of Westminster University of Gothenburg
Oslo	Oslo commune	Steen & Strøm	TOI
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Southampton	Southampton City Council	Meachers Global Logistics	University of Southampton
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Executive summary

One of the strengths of the CITYLAB project relates to its *ex-ante*/implementation/*ex-post* logic which allows to test not only the acceptance level towards the innovative solution to be proposed and to fine-tune it before its implementation (*ex-ante* analysis), but also any possible behavioural and perception change among stakeholders after it; in this respect, economic and behavioural aspects are crucial.

The *ex-ante* behavioural analysis allows to evaluate the degree of acceptance of the CITYLAB solutions through stakeholders' perceptions before they directly experience implementations. This analysis led to the identification of barriers/opportunities and necessary strategic/operational prerequisites for the innovative solutions proposed and, where applicable, a first measurement of willingness to pay (CITYLAB, 2018a).

The *ex-post* behavioural analysis is relevant for the Living Lab approach, since it allows for the evaluation of the implementation focusing on stakeholders' perceptions. Broadly speaking, when a solution is implemented, it is not only possible to check if the goal has been achieved fully or partially, but also, when dealing with behavioural analysis, any change in the reaction of the respondents can be considered a result worth being analysed. As a consequence, the comparison of *ex-ante* and *ex-post* behavioural analyses, which allows for a potential further fine-tuning of the solution implemented, through which it is possible to identify additional necessary adjustments for innovative solutions, it is useful to identify any change in the perception of the proposed initiative. Indeed, the main aims of this comparison are to evaluate, after on-field implementations, any change in the: (i) degree of acceptance of the CITYLAB solutions through stakeholders' perceptions; (ii) stated behavioural reaction to the solution; (iii) willingness to pay for the solution. Moreover, exploring stakeholders' behavioural response allows to evaluate the potential to transfer a CITYLAB solution to other cities, and consequently identify which are the best accompanying instruments to favour the roll-out, take-up and diffusion of the experiences conducted. This can be performed by replicating the *ex-ante* behavioural analysis, performed in a Living Lab, in other cities.

Deliverable 5.5 is organised in two parts.

Part I presents the *ex-post* behavioural analysis carried out in those cities where a demand-side solution has been implemented. Specifically, among the 7 Living Labs of the CITYLAB project, only 3 concerned demand-side solutions: Brussels, Oslo and Rome. Out of these 3, since Oslo has not yet implemented its solutions, only Brussels and Rome have carried out the *ex-post* behavioural analysis. Results show that, after the on-field implementations, there has been a positive (stated) behavioural reaction to solutions, especially in terms of increased degree of acceptance and willingness to pay. Furthermore, learnings coming from the *ex-ante* analysis have been reinforced, strengthening the need for a better fine-tuning of solutions.

In Part II the behavioural analysis for transferability of CITYLAB solutions is tested both within and outside the Living Labs. Specifically, the *ex-ante* analysis for CITYLAB implementations performed in a given Living Lab (CITYLAB, 2018a) has been replicated in another Living Lab, chosen according to a specific methodology. Moreover, two out of seven solutions have been proposed in other cities within the same country and, therefore, an additional analysis is conducted to obtain relevant information on the potential replicability of the solutions tested. Results show that, from a behavioural perspective, the initiatives implemented initially in Amsterdam, Brussels and Rome seem very good candidates for being transferred (respectively to Rome, Paris and London), while less so for London and Southampton solutions (respectively to Oslo and Amsterdam). Additionally, it is worth noticing that transferability among cities within the same country seems more likely to be successful. This output is complementary to results from CITYLAB (2018b), where transferability within CITYLAB cities is examined through TIDE methodology, and CITYLAB (2018c), where MAMCA workshops in CITYLAB cities were organised to stimulate transfer of the CITYLAB implementations.

1 Introduction

The objective of the CITYLAB project is to develop knowledge and solutions that result in up-scaling and further implementation of cost effective strategies, measures and tools for emission-free city logistics. In a set of Living Laboratories, promising logistics concepts are tested and evaluated, and the fundament for further rolling-out of the solutions is developed.

CITYLAB WP 5 aims at providing details on the impact of each of the seven implementation activities, in order to evaluate its performance in the original context and its potential replicability in other contexts. In particular, task 5.5 investigates behavioural analysis and willingness to pay for the solution, on one side, and the transferability of solution between Living Labs, on the other.

To this aim, data on the living lab context and implementation coming from the other work packages are also used. In more detail, for each CITYLAB implementation, task 5.5, also making use of the information and data previously acquired (e.g. task 2.2), tests stakeholders' behavioural response.

In order to evaluate both the introduction of the CITYLAB solutions and the potential to transfer them to other CITYLAB cities, a behavioural analysis is performed.

Specifically, the potential impact on stakeholders involved deriving from having experienced the innovations proposed is investigated carrying out an *ex-post* behavioural analysis.

This is a key point from a policy perspective, since it sheds light on the possible facilitation actions that are most likely going to provide a relevant contribution to the realistic adoption of the solutions. It should be tested, rather than implicitly accepted, which are the best accompanying instruments to favour the roll-out, take-up and diffusion of the implementations deployed.

Furthermore, in order to test the potential transferability of the solutions taking into account behavioural aspects, the *ex-ante* survey for the CITYLAB implementation performed in a given Living Lab has been replicated in a different Living Lab and in some other interested cities.

The first part of this deliverable is based on *ex-post* behavioural analysis of demand-side implementations¹. Specifically, among the 3 cases (Brussels, Oslo and Rome), being the Oslo initiative not implemented yet, only the two solutions of Brussels and Rome have been investigated throughout questionnaires administered in Autumn 2017. Moreover, as the CITYLAB initiative in Rome was explored also throughout a Stated Choice Experiment, the *ex-post* analysis has been extended accordingly.

The main goal is to compare the results of the *ex-ante* and *ex-post* questionnaires, so to explore the potential impact on the behaviour of the involved stakeholders. Actually, having experienced the innovation proposed in the implementation of the solution, they may have changed their behaviour: this is investigated carrying out an *ex-post* behavioural analysis and comparing it with the corresponding *ex-ante* behavioural analysis.

The second part of this deliverable aims at testing, under a behavioural perspective, the transferability of the solutions implemented in the various Living Labs by analysing stakeholders' perceptions. To this aim, the *ex-ante* survey for the CITYLAB implementation performed in a given Living Lab (see CITYLAB, 2018a) has been replicated:

(i) in a different CITYLAB city according to a specific methodology assuming that each solution is evaluated in one city and, at the same time, each city tests one solution (Transferability within CITYLAB Living Labs);

¹ Demand-side implementations are those solutions whose impacted stakeholders are end-users, such as citizens or receivers. For further details on the different type of solutions - demand-side and supply-side - please see CITYLAB (2018a).

(ii) in other interested cities directly involved by some Living Labs (Transferability outside CITYLAB Living Labs).

The overall idea is to compare the results of the *ex-ante* questionnaire about the proposed solution in different cities, so to investigate if and how the seven implementations can be transferred and scaled to other cities, i.e. its potential adoption and success elsewhere.

Document structure and reading guide for this deliverable

Deliverable 5.5 comprises two main parts:

- Part I focuses on the behavioural analysis, underlining the comparison between *ex-ante* and *ex-post* surveys carried out among stakeholders in those cities which have already implemented their demand-side solution. Chapter 2 reports the results of the *ex-post* behavioural analysis. Questionnaire structure is firstly provided, while an in-depth description of the two *ex-post* analyses, and the comparison with the corresponding *ex-ante* surveys, in the cities of Brussels (2.1) and Rome (2.2) is then reported. Then, since in Rome a Stated Choice Experiment had also been carried out from an *ex-ante* perspective², chapter 3 describes the results of and the comparison with the related *ex-post* analysis. Chapter 4 provides some general conclusions on the *ex-post* behavioural analysis.
- Part II discusses the transferability of the CITYLAB solutions by replicating the *ex-ante* behavioural analysis in other contexts. After a brief introduction describing how the matching of Living Lab cities have been created, chapter 5 presents the results of the *ex-ante* analyses in the 7 CITYLAB Living Lab cities (Amsterdam, Brussels, London, Oslo, Paris, Rome and Southampton). Chapters 6, instead, describes the results of the analyses furtherly carried out in Antwerp (evaluating the proposal of Brussels) and in Milan (evaluating the proposal of Rome). Some overall conclusions on the behavioural analysis for transferability of the CITYLAB solutions follow in chapter 7.

² See CITYLAB (2018a), Section 7.

PART I. *Ex-post* behavioural analysis

One of the strengths of the CITYLAB project relates to its *ex-ante*/implementation/*ex-post* logic. In this respect, economic and behavioural aspects are crucial.

In particular, if the *ex-ante* behavioural analysis plays a key role in the Living Lab approach, allowing for a fine-tuning of the solution proposed and its implementation, the *ex-post* behavioural analysis is also crucial for the Living Lab approach, since it allows for the evaluation of stakeholders' perceptions and behaviour change.

Actually, when a solution is implemented, it is possible to check if the goal has been achieved fully or partially; nonetheless, when dealing with behavioural analysis, any change in the reaction of the respondents can be considered as a result that is worth being analysed.

As a consequence, the comparison of *ex-ante* and *ex-post* behavioural analyses can provide useful knowledge on the stakeholders' behaviour change. The main aims of this comparison are thus to evaluate any change in the:

- degree of acceptance of the CITYLAB solutions through stakeholders' perceptions (reduced or increased);
- stated reaction to the solution (in terms of reduced or increased willingness to participate in the initiative);
- willingness to pay for the solution (reduced or increased)

after they have directly experienced implementations.

The potential impact on stakeholders involved deriving from having experienced the innovations proposed is investigated through an *ex-post* behavioural analysis and comparing it to the *ex-ante* results.

In particular, this analysis has been carried out in those cities where the demand-side solution was implemented. Specifically, among the 7 Living Labs of the CITYLAB project, only 3 concerned demand-side solutions: Brussels, Oslo and Rome. Since Oslo has not implemented (yet) its solutions, and its demand has not experienced it, no *ex-post* analysis was possible. Therefore, only Brussels and Rome have carried out the *ex-post* behavioural analysis throughout questionnaires administered in Autumn 2017. Moreover, as the CITYLAB initiative in Rome was also explored via a Stated Choice Experiment, the *ex-post* analysis has been extended accordingly.

The main idea is to compare the results of the *ex-ante* and *ex-post* analyses; to this aim, the questionnaire used for the *ex-post* analysis was created starting from the *ex-ante* version.

Part I of Deliverable 5.5 includes 3 chapters. The first (chapter 2) presents the *ex-post* behavioural analyses performed in Brussels and Rome. A further in-depth *ex-post* analysis, related to a Stated Choice Experiment carried out in Rome, follows in Chapter 3, while the last chapter provides some overall conclusions on the *ex-post* behavioural analysis.

2 The CITYLAB *ex-post* behavioural analysis

This chapter assesses effects and consequences of the solutions implemented with specific regard to the changes in stakeholders' preferences and their willingness to pay for the solutions. To this aim, in the two cities where the demand-side solution has already been implemented, questionnaires were administered to key stakeholders after they have experienced the solution.

In order to compare the results of the *ex-ante* and *ex-post* behavioural analyses, the questionnaires used for the latter were created starting from the ones used for the former³, even though certain questions were partially changed, or in some cases eliminated, while others added⁴.

The *ex-post* questionnaire includes the following 4 sections:

- A. **type of interviewee** (questions 1 and 2): respondents were asked to select a specific category they belong to (question 1) and to say if they have participated in the *ex-ante* survey (question 2).
- B. **evaluation of the solution proposed**: respondents have to answer to 3 questions: (i) to express their level of agreement, using a 7 point Likert scale⁵, with the fact that the solution, after being adopted, is: individually acceptable, technically feasible, financially viable, environmentally beneficial and socially desirable (question 3); (ii) to declare how important was the practical adoption of the solution in influencing the judgments expressed in question 3 (question 4); (iii) to inform if the solution could be improved (question 5).
- C. **stated behavioural reaction to the proposed solution**: respondents are asked: if and when they are willing to adopt the solution (question 6) and to explain why (question 7); if they would recommend the solution to others (question 8) and to whom in particular (question 9); if the solution requires/implies behaviour changes (question 10).
- D. **willingness to pay**: finally, question 11 explores the willingness to pay for the implementation of the proposed solution. Specifically, respondents are asked to say if they would be willing to pay for it: if they say yes, they have to specify how much they would pay; conversely, they are asked to say if any other should pay for it and how much.

³ For details on *ex-ante* questionnaires, see CITYLAB (2018a), Appendix B.

⁴ For details on *ex-post* questionnaires, see the Appendix.

⁵ Likert scale provides the following levels of agreement with the statement about the solution proposed and/or its benefits on the current situation: *Extremely disagree*, *disagree*, *somewhat disagree*, *neither agree nor disagree*, *somewhat agree*, *agree*, *extremely agree*.

2.1 Brussels implementation: Increasing vehicle loading by utilising spare capacity

The City Logistics Living Lab in Brussels⁶ focuses on the distribution of goods to small independent stores, or nanostores. Actually, the current situation presents two main critical points: on one side, an inefficient store owner collection process; on the other side, low vehicle load factors of the service providers. In brief, with about 900 independent small grocery stores⁷ replenishing stock at least twice per week - mostly going and buying goods to a wholesaler and only in some cases receiving shipments by van delivery through a distributor - there is an unsustainable number of deliveries. The CITYLAB aims thus at replacing inefficient store owner collections and increasing the vehicle load factors of the service providers. The main concept of the solution proposed is to introduce a new online sales channel and to use spare van capacity from existing service providers to reach these stores. Procter & Gamble offers the possibility to order products from their assortment online and have them delivered to stores at a competitive price.

According to the answers provided to the *ex-ante* questionnaire⁸, the acceptance level of the solution was quite low, mainly due to:

- the widespread perception of the present situation as good and convenient;
- the reluctance towards prior payments and ordering online;
- a certain scepticism about the financial viability of the solution.

As a consequence, suggestions were provided, concerning promotions and payment options and products to the proposed solution. At the same time, the solution is considered somewhat environmentally beneficial, and a hypothetical collaboration between manufacturers, leading to a joint delivery service and a wider product assortment (also non-food), is wished for incentivizing online orders. P&G used the results of the *ex-ante* behavioural analysis in order to make adjustments while approaching the storeowners to participate in the implementation: the aim was to re-establish direct contact with independent retailers, while reducing the number of own account pick-ups. Within this context, 4 stores involved in the *ex-ante* survey that have experienced the solution⁹ (i.e. they ordered and had their products delivered by the owner of spare transportation capacity) were visited; out of these, 1 refused to answer to the *ex-post* questionnaire.

A) Type of interviewee

The *ex-post* behavioural analysis is performed by submitting questionnaires to store owners already participating in the *ex-ante* survey who experienced the solution by ordering online.

B) Evaluation of solution proposed

The first main output of this comparison concerns the **evaluation of the proposed solution** that may be changed after the experience of the solution. Like in the *ex-ante* survey, interviewees were asked to state their level of agreement (from *extremely disagree* to *extremely agree*) with five statements regarding the proposed solution, after being adopted; results are presented in the table below.

⁶ The main stakeholders are: Mobility department of Brussels-Capital Region, Vrije Universiteit Brussel, Procter and Gamble, Febelco (pharmacy distribution), a distributor and nanostores (receivers).

⁷ Source: www.shopinbrussels.be.

⁸ For further details see CITYLAB (2018a), Chapter 7.

⁹ The implementation was put on hold at the end of September 2017, after 3 months of trial (March – June 2017).

Table 1. Evaluation of the proposed solution (ex-post) – Brussels

	Extremely disagree	Disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Agree	Extremely agree
<i>Individually acceptable</i>						✓✓	✓
<i>Technically feasible</i>						✓✓	✓
<i>Financially viable</i>						✓✓✓	
<i>Environmentally beneficial</i>				✓✓✓			
<i>Socially desirable</i>				✓✓✓			

✓ shows the selected option by each respondent.

No respondent ever matched any disagreement box for any of the five statements, suggesting they are quite confident that the solution will be effective; more precisely, they are just less convinced about the benefits for environment and society (Table 1).

Actually, according to the *ex-ante* analysis, no respondent ever matched both the “extreme” boxes (neither the “agree”, nor the “disagree” one) for any of the five statements, and many answers were neutral; this suggested they might be not so sure about their judgements.

Therefore, after the solution implementation, not only no respondent matched disagreement boxes for any of the five statements, but also some “extreme” (positive) boxes were matched, suggesting they are now quite confident that the solution will be effective.

Going further with the assessment of each single aspect, before the implementation, respondents were quite sceptical about individual acceptability, technical feasibility and financial viability. Thanks to the implementation of the solution the situation has changed, since every respondent believes in the effective impact of the solution on these aspects.

Instead, following the *ex-ante* analysis, most respondents showed a certain indifference towards the expected environmental and social benefits. After the solution implementation the opinion of the stakeholders involved in the survey is also less clear: everyone chose the neutral option. This could be explained by the fact that before the implementation, the store owners only attached the obvious “not-economical” sustainable aspect (green and social) to the solution, becoming even more worried about a possible price increase. Besides, respondents declare that the implementation of the solution has been quite important (at least “somewhat”, see Table 2) in the judgements they expressed in their answers to question 3.

Table 2. Importance of the implementation - Brussels

	Extremely Low	Low	Somewhat Low	Neither Low nor High	Somewhat High	High	Extremely High
Importance of the solution implementation in influencing answer 3					✓✓	✓	

✓ shows the selected option by each respondent.

They also think that the solution can be improved and provide some suggestions accordingly: e.g. a bigger product assortment (in addition to non-food, also drink and food), a better information (e.g. a brochure), and the possibility to pay cash instead of online.

C) Stated behavioural reaction to the proposed solution

Focusing on the stated behavioural change induced by the implemented solution, it is possible to notice that the percentage of store owners willing to adopt the proposed solution increased. In more detail, according to their answers, 2 out of 3 interviewees are willing to adopt the proposed solution in the short run and to recommend it to other storeowners, even with any minimum order value < 100-150 euro, provided that more products are offered: prices are

considered competitive and the website very easy to use. The third respondent would adopt the solution in the long run and maybe will tell other retailers about it. They all think that the solution is good for their own kind of activity. On the contrary they have different impressions of the needed behavioural change (Table 2).

Table 3. Behavioural change required by the solution - Brussels

	Extremely Low	Low	Somewhat Low	Neither Low nor High	Somewhat High	High	Extremely High
Expected level of behavioural change				✓	✓	✓	

✓ shows the selected option by each respondent.

Among the “changes”, respondents identify the need to: learn how to deal with the online application and the website (*neither low nor high level*); pay online instead of paying cash (*somewhat high*); change the habit of going to the wholesaler (*high*).

Moreover, in assessing the “behavioural change”, the respondents are attracted by the convenient prices, and disappointed with the small assortment.

D) Willingness to pay

The last question regarded the **willingness to pay delivery costs** in case the purchase cost for the merchandise remains the same. All the respondents answered they would be willing to pay on average 3€ (Min 2; Max 5) for delivery costs, even with a *minimum* amount (100-150€), while they previously were not.

Ex-post vs ex-ante behavioural analysis in Brussels: conclusions

Broadly speaking, despite the small size of the sample, the impact of having experienced the solution seems quite clear: the acceptance level of the solution increased and retailers are more willing to participate in the initiative and to pay for it. Quite interestingly, respondents seem well aware of the fact that the implementation of the solution has been at least “somewhat important” in the judgements they expressed; on the other hand, they also think that a certain behavioural change is needed, especially in terms of changing the replenishment habits and paying online instead of cash. They also declare that the solution can be still be improved enlarging the product assortment (e.g. also including food products), maintaining prices competitive and improving communication about it. Furthermore, after having experienced the solution, they all will quite surely inform other retailers about the solution in order to recommend it.

As a conclusion, even taking into account a small number of respondents - which suggests trading carefully when dealing with these comparison results, it could be said that implementing the solution in Brussels has “revealed” to the store owners involved that the solution can really solve inefficient store owner collections and low vehicle load factors of the service providers. It is really possible to use the spare capacity in vans to carry out deliveries without driving additional kilometres, thus integrating the solution in the operations of both P&G and the owner of spare transportation capacity and reducing freight trips.

This awareness of the financial convenience and technical feasibility of the solution among the store owners, results in the increased trust among respondents, being now able to overcome their reluctance to order online and to pay in advance for their products.

Lastly, since they declare they are willing to tell other retailers about the solution, there could be also the possibility that others store owners will probably follow in the next future; since the target of this solution seems to be quite reluctant to the online processes, the solution itself might take longer to be widely shared and fully accepted. Nevertheless no storeowner ordered a second time, casting a shadow on the reliability of the respondents’ stated intentions. It could then be argued that the solution might be furtherly improved, taking inspirations from what

emerged in the present analysis, in order to make retailers really doing what they state they are willing to do.

2.2 Rome implementation: Integration of direct and reverse logistic flows

The proposed solution in the Rome Living Lab¹⁰ concerns the integration of direct and reverse logistic flows in urban areas. Actually, the current door-to-door system for the collection of recycling materials implies fragmentation and proliferating trucks, while *ad-hoc* collection points require infrastructure interventions, greater citizens' effort and involvement, additional dedicated trips; all of which negatively impact on both environment and logistics service efficiency.

The aim of the CITYLAB solution is to improve clean waste collection so to increase the recycling while also minimizing the amount of transport-related externalities.

The main idea is that a parcel company picks up boxes of recycled materials while also delivering mail and parcels, using green/electric vehicles; this could also increase logistics vehicle load factors while reducing the reverse vehicle number and movements and consequent congestion and polluting emissions.

In the first round of the Living Lab, the small scale experiment is tested on a specific recyclable material (plastic caps) and in a small area (around 1km²); its implementation has involved the national postal operator (Poste Italiane), and four department buildings of the University of Roma Tre, where a plastic caps recycling initiative has being developed since 2005¹¹.

The specific collection process can be described in two steps: i) involved people bring plastic caps to a specific collection point¹²; ii) others (mostly university personnel) are asked to come, pick up and deliver plastic caps to the central collection point (located at the Rectorate). The general collection from peripheral collection points, which was previously signalled to the University Mobility Manager on a voluntary basis, was performed *via* an *ad-hoc* procedure and thus constrained by actual availability of participants; this implied detours or dedicated trips characterised by extremely low load factors.

To face this problem, Poste Italiane has been asked to endorse the reverse logistics: while delivering mail/parcels to the addressee, its operators pick up the (full) boxes directly from the addressee during their transportation route and delivers them to the central collection point using electric vehicles.

According to the results of the *ex-ante* behavioural analysis¹³, respondents already showed general positive propensity towards recycling, environmental issues in the distribution process as well as – even at a lower scale - charitable initiatives, thus confirming the relevance of the issue investigated.

Information from the *ex-ante* analysis have then been used to build up the new configuration of the recycling system that should/could imply a higher amount of plastic caps recycled in addition to a reduced environmental impact of the distribution process.

A) Type of interviewee

¹⁰ The main stakeholders are: Rome City Council, University of Roma Tre, Poste Italiane, Mobility Agency of Rome, MeWare, Logistics Operators Associations, Retailers Associations, Citizens Associations.

¹¹ The plastic caps have been used for charitable initiative (details available at <http://www.uniroma3.it/news.php?news=1149>) and for the work of art named "Wasteland" (details available at <http://www.garbagepatchstate.org/eng/the-garbage-patch-state-project.html>).

¹² Several collection points are located in various buildings of the University.

¹³ For further details see CITYLAB (2018a), Chapter 11.

In December 2017, the *ex-post* behavioural analysis is performed by submitting questionnaires to 8 representatives of the university who had participated in the *ex-ante* survey.

B) Evaluation of solution proposed

Asked about their level of agreement (from *extremely disagree* to *extremely agree*) with five statements regarding the solution, once adopted, interviewees seem to have few doubts about it (Figure 1).

In particular, they are very confident in its positive impact on the environment and its level of individual acceptability; furthermore, they mostly agree with the financial viability which, instead, was previously uncertain (almost 40% of the sample did not consider the business model presented as self-sustaining).

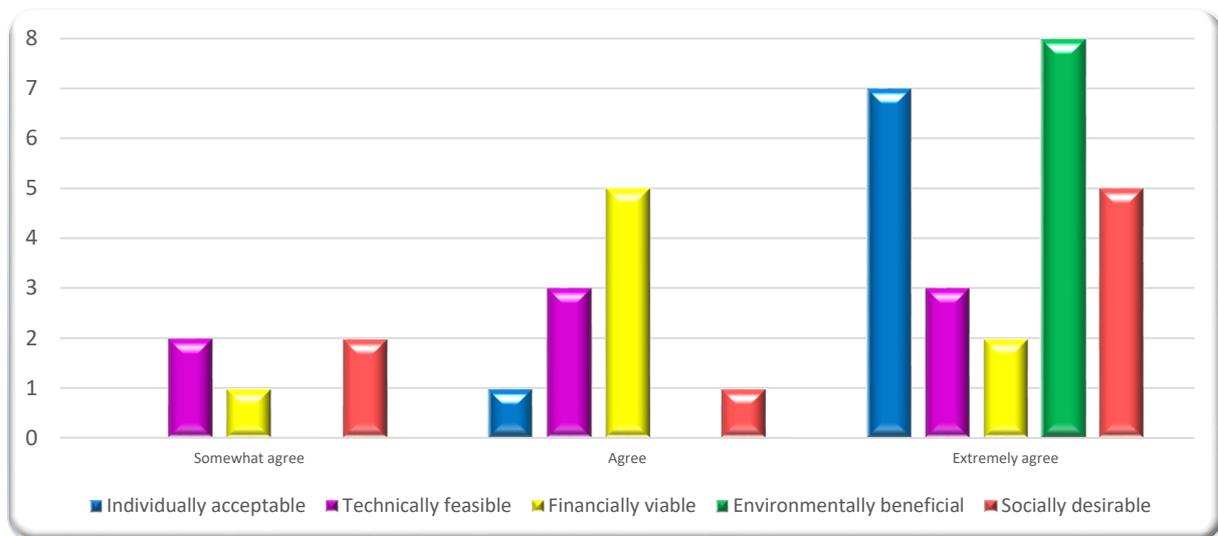


Figure 1. Evaluation of the proposed solution (ex-post) – Rome

On the contrary, there is a great heterogeneity among respondents, when asked to state the level of importance of the solution implementation in influencing their answer to the previous question 3.

Table 4. Importance of the implementation – Rome

	Extremely Low	Low	Somewhat Low	Neither Low nor High	Somewhat High	High	Extremely High
Importance of the solution implementation in influencing answer 3	✓	✓✓	✓		✓	✓✓	✓

✓ shows the selected option by each respondent.

Following this enthusiasm for the solution, none thinks that big changes are needed for improving it. One of the respondents even considers it as a downright *optimum* (i.e. it is not possible to improve it) while for all the others it would be possible to improve it only marginally (50%) or changing some elements (38%).

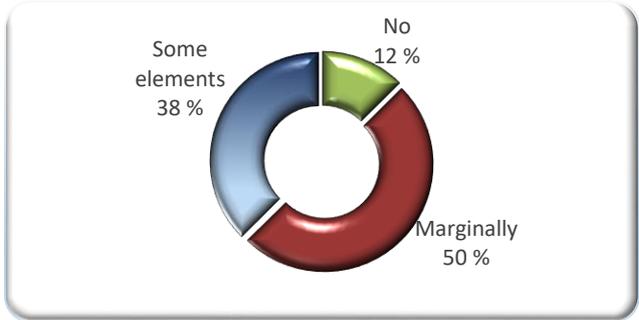


Figure 2. Possibility to improve the solution – Rome

Accordingly, they provide some suggestions that can be grouped like follows: on one side, improvements can be related to intangible aspects, like an easy and viral information, sensitizing campaigns and events, more exposure on the social media; on the other side, an increase in the service efficiency could be achieved by creating more place for the recycled material, i.e. emptying the boxes more often, increasing the number of bins or their size.

C) Stated behavioural reaction to the proposed solution

In this section, which explores the behavioural reaction of the sample, respondents answered almost unanimously. The whole sample is willing to adopt the proposed solution in the long run, due to its (mostly environmental) sustainability; in one case the social and artistic/cultural aspects are also referred to by the respondent. Interestingly, also the “easiness” of contributing to the recycling is considered a motivation for adopting the solution in such a way/run.

Again, all the respondents said they would certainly recommend other people to adopt the solution. They also consider it replicable in other cities; specifically, among those who detailed their answers, the requirements are: size and (dense) population; eco-friendliness; good level of governance and communication/participation. Indeed, they are all convinced that the solution implies/requires a behavioural change; nonetheless, they don’t agree about the level of behavioural change needed (Table 2).

Table 5. Behavioural change required by the solution - Rome

	Extremely Low	Low	Somewhat Low	Neither Low nor High	Somewhat High	High	Extremely High
Expected level of behavioural change			✓✓		✓✓✓✓	✓	✓

✓ shows the selected option by each respondent.

Among the “changes”, respondents consider: the sense of responsibility; the environmental consciousness in consumption and waste handling (i.e. recycling habits).

Moreover, the respondents identified a good information campaign on the aims of the initiative as the most important factor for spurring a behavioural change, followed by educational and sensitizing activities, participation and practical actions (like giving a good example or increasing the number of bins); innovation aspects also seem to play a role.

At the same time, the behavioural change seem to be hampered/hindered by a sort of cultural laziness related to routine and habits; by a general carelessness and indifference to environmental topics/issues; also by the lack of information, both pull and push, i.e. ignorance on one side, and poor communication, on the other side which fails in providing *stimuli* for the change.

D) Willingness to pay

The last question of this section investigates the **willingness to pay for having the solution implemented**. 75% of the respondents answered they would be willing to pay a certain amount of money per year: Min 12; Max 240€. Even more interestingly, they all think that others should pay; specifically, they identified the local administrations (50%), the local waste management company (25%), the University (25%), private businesses (25%), the citizens (13%). Again, the amounts are very different: min 120€, Max 10.000€. Compared to the ex-ante answers to this question, the share of respondents willing to pay a certain amount of money per year increased (from 62.5% to 75%) and the average amount that would be paid also increased by 66%.

Ex-post vs ex-ante behavioural analysis in Rome: conclusions.

After having experienced this new solution, interviewees keep on believing in the positive impact on the environment and level of individual acceptability of the implementation; furthermore, they are now totally convinced also of its financial viability, which was previously doubtful.

Nevertheless, respondents present a great heterogeneity when declaring the level of importance of the solution implementation in influencing their evaluations.

Actually, despite their direct involvement in the recycling initiative, many respondents had not a clear view on the system yet, thus reflecting a general lack of information about the initiative and the collection system itself.

Those unsatisfied mainly complain about the lack of information on the initiative and its purpose(s), and an inefficient system leading to high probability of finding full boxes where no additional material can be deposited. Accordingly, even if no big changes seem to be required in order to improve the solution, some enhancements can be related to intangible aspect (an easy and viral communication) or efficiency, e.g. by increasing the number of bins for recycled material.

Very interestingly, the effectiveness of the CITYLAB solution in Rome seems more dependent upon the final users' behaviour than upon the recycling system itself.

Indeed, respondents are all convinced that the solution implies/requires a behavioural change, somewhat high for the most of them, because involving environmental consciousness; accordingly, a good information/communication campaign is required, together with educational and sensitizing initiatives, participation and practical and innovative actions.

All of them are now willing to adopt the proposed solution in the long run and to recommend other people to adopt the solution. Moreover, compared to the *ex-ante* answers to the same question, the share of respondents willing to pay for the solution increased, as well as the average amount that would be paid.

In conclusion, the solution experience seems to reinforce opinions of the respondents more than changing their view on the issue; nevertheless, their suggestions highlight the importance of a good information campaign and sensitizing initiatives among population towards recycling and environmentally friendly waste disposal and transportation processes.

These promising results favoured the extension of the implementation in the second round of the Living Lab according to the recently passed action plan of the Environmental Department of the city of Rome.

3 A further investigation: Stated Choice Experiments in Rome

Data collected among stakeholders led to the identification of their preferences about the solution characteristics. To this aim, starting from the *ex-ante* version, an *ex-post* questionnaire was prepared and administered in order to elicit stakeholders' general opinions and preferences about alternative scenario configurations of the implemented solution after having experienced it. In particular, preferences about hypothetical scenarios were elicited via Stated Choice Experiments, while Discrete Choice Models were used for data analysis (Gatta and Marcucci, 2014); specifically, a Multinomial Logit model has been adopted.

A Stated Choice Experiment consists of several choice sets, each involving two or more alternatives, described by several attributes. Each attribute has two or more levels that are plausible over a reasonable range. Each respondent is asked to choose one of the options presented in the choice set according to his/her preferences¹⁴.

The idea is to study the relative influence of independent variables (attributes) on a given observed phenomenon (choice) under a robust microeconomic framework (Louviere *et al.*, 2000).

The questionnaire consists of three parts: the first one includes general information and opinions about the initiative, while the second one reports the choice tasks aimed at testing preferences between different scenario configurations; some data about respondents' socio-demographic characteristics and about attitude towards the environment are asked in the last part.

Attributes included in the different scenarios come from the *ex-ante* analysis¹⁵; actually, interviewees were asked to respond to a sequence of tasks where they had to choose one option within a finite and self-excluding choice set.

The statistical design adopted in this specific application allows each of the possible level combinations to appear at least once. The design adopted was divided in 5 blocks corresponding to 5 versions of the questionnaire. Each option was characterised by 5 attributes with 2 levels each.

In more detail, the attributes used are:

- (1) aim of the initiative (to improve UR3 services/charity);
- (2) caps-throwing mode (one cap/more caps per time);
- (3) transport system used (environmentally/non environmentally friendly);
- (4) probability to find boxes full (low/ high),
- (5) gamification (yes/no).

The questionnaire was administered to students, professors and university staff through *CAPI* (Computer-Assisted Personal Interviews).

A sample of 460 people was interviewed. Respondents, almost equally divided by gender (53% are females), are coming from 4 different departments of UR3: 28% from Political Sciences, 23% from Engineering, 25% from Law and 24% from Letters. Apart from 7% of professors and 11% of staff members, the others are students (81%); consequently, most of the respondents are under 30 years of age.

¹⁴ For an in-depth discussion on Stated Choice Experiments and Discrete Choice Models, please see CITYLAB (2018a).

¹⁵ Which in turn have been selected following the results provided by focus groups and, more broadly, by a survey previously conducted among key stakeholders.

3.1 A comparison between *ex-ante* and *ex-post* analyses

Although they are all well aware of the initiative, only 53% had participated throwing 1 cap (20%), 2-5 caps (40%) or 6-20 caps (27%); among these, only 10% throw caps daily, 27% weekly and 38% monthly.

26% of participants found the bin full; in this case 41% keep on trying until they succeed: 11% gave up immediately, 21% after one more time and 27% after many attempts. To be compared with actual behaviour, the intentions of those who never found the bin full: among them, 25% would have thrown the cap elsewhere, while 33% would have insisted. 24% would have tried again at least one time, 18% more than 2 times.

In any case almost all the sample that had already participated in the initiative, would keep on participating.

Among those who had not, instead, almost 40% declare to be not interested about the initiative purpose or its possible utility. More interestingly, 11% “forgot” it while another 7% did not find useful information; this could be crucial for structuring a better information campaign. Moreover, another 28% participates in recycling or similar initiatives elsewhere (15%) or does not use plastic bottles (13%), thus disclosing an environmentally friendly behaviour anyway.

Asked about the possibility to recommend the initiative, only 5% of respondents would not tell the solution to other people. The others would use innovative communication tools such as a social network (64%) while 30% prefer to communicate by word of mouth or throughout an institutional campaign (newsletter or flyers) (5%).

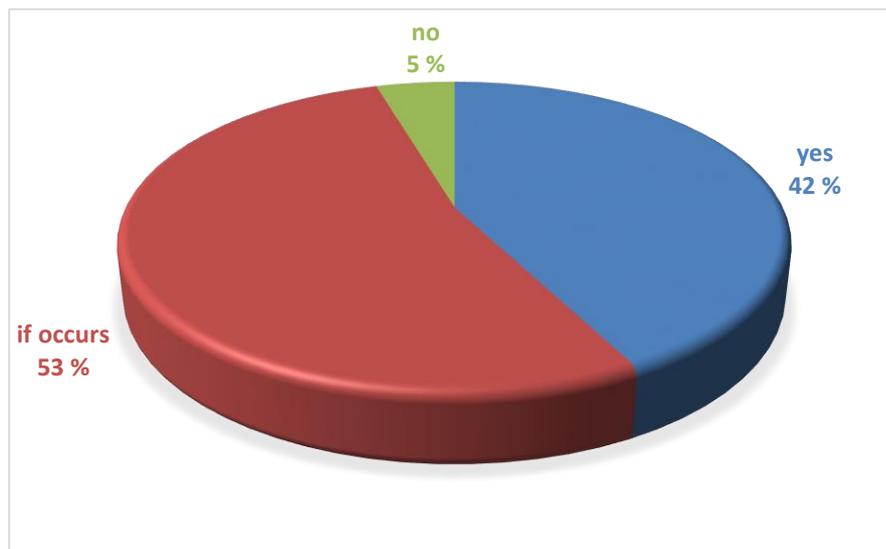


Figure 3. Willingness to recommend the solution - Rome

Lastly, 71% of respondents would recycle other materials, such as glass or exhausted batteries and electronics components or also those materials that are already collected at the university, like plastic or paper.

Interestingly, asked about the impact of participating at the initiative on their recycling behaviour in general, 5% seems to be really affected; 31% said they changed very few and 27% has not changed at all.

The last section of the questionnaire goes in-depth with the environmental and recycling behaviour of respondents, presenting a table asking for stated behaviour regarding sensitivity to environmental issues. Respondents had to choose between five possibilities¹⁶.

Being the first statement “when I hear about environmental problems I am interested and seek information”, around 14% of the sample answered “never” or “rarely”, while 34% of respondents answered “sometimes” and about 50% stated they “often” or “always” get informed.

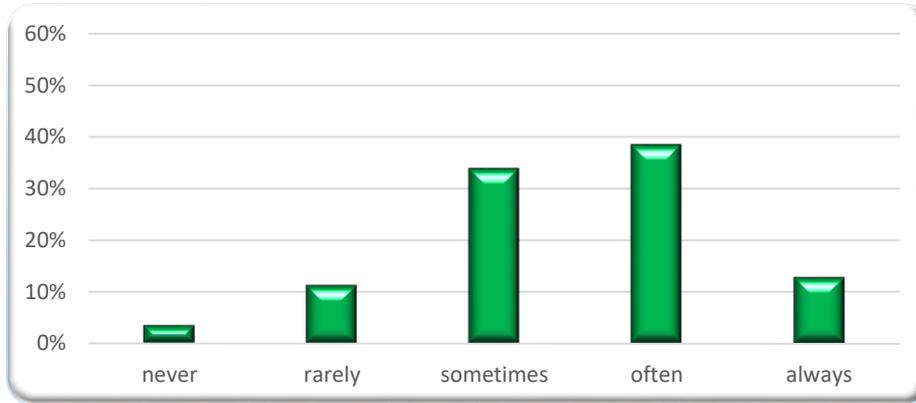


Figure 4. Level of agreement with the statement: “when I hear about environmental problems I am interested and seek information” - Rome

These numbers show an increased environmental concern among the sample; actually, before the implementation, about 20% of the respondents answered they were “never” or “rarely” interested and seeking information, 42% answered “sometimes”, about 38% selected “often” or “always” options.

Second statement was “I sign petitions in favour of environmental protection”. In this case only about 14% answered *often* or *always*, while 35% stated they never signed for environmental protection initiatives. These results are in line with those of the *ex-ante* survey.

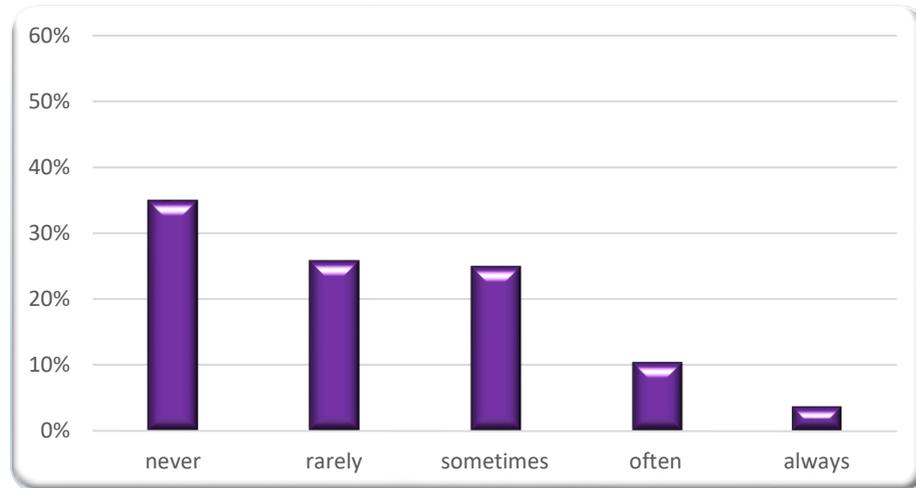


Figure 5. Level of agreement with the statement: “I sign petitions in favour of environmental protection” - Rome

¹⁶ The Likert scale adopted provides five possible levels of frequency in a behaviour: “never”, “rarely”, “sometimes”, “often”, “always”.

The same holds when dealing with financial support to green initiatives: when asked if they make economic contribution to environmental groups, almost 60% answered “*never*”, while only 5% matched “*often*” or “*always*”. Even in this case, no big changes in the respondents’ behaviour occur due to the solution experience.

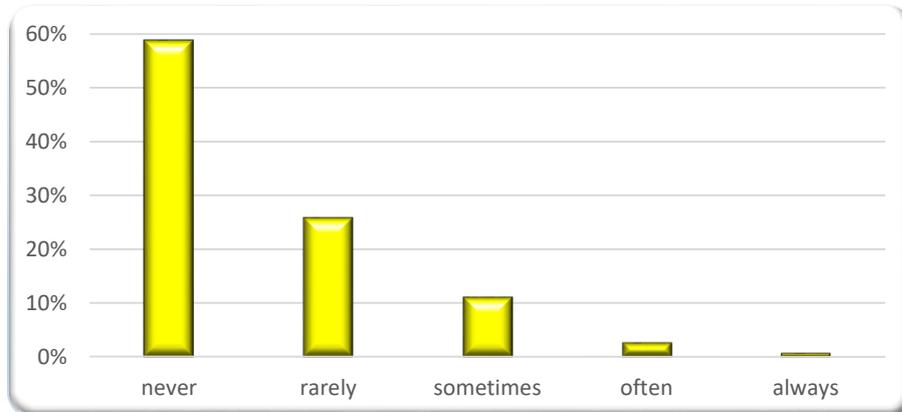


Figure 6. Level of agreement with the statement: “I make economic contribution to environmental groups” - Rome

32% stated they sometimes collect waste present in public places, although left by others, while 25% declared they do so “*often*” or “*always*”, with a little decrease compared to the *ex-ante* results.

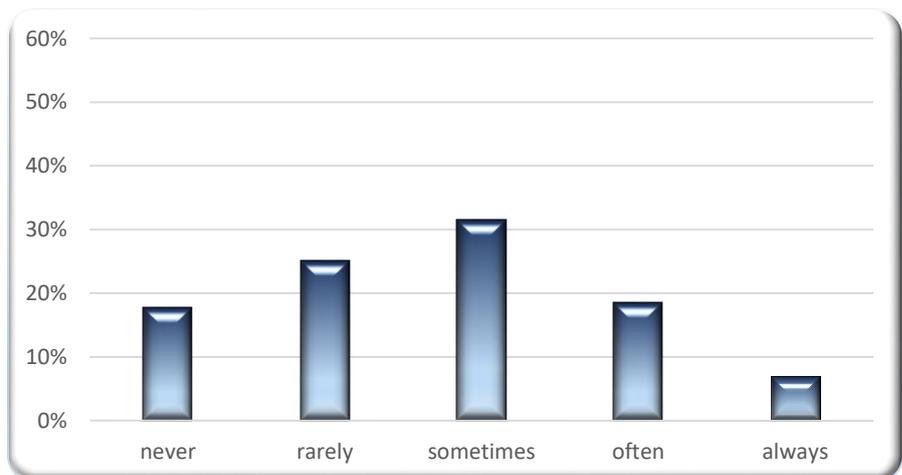


Figure 7. Level of agreement with the statement: “I collect waste present in public places, although left by others” - Rome

When asked if they generally prefer to use vehicles less polluting than cars, 27% of the sample matched “*sometimes*” option, 28% the “*often*” one and 14% chose “*always*”, this can be considered an improved situation compared to the *ex-ante* one, where the sample was split in two about this sustainable mobility issue.

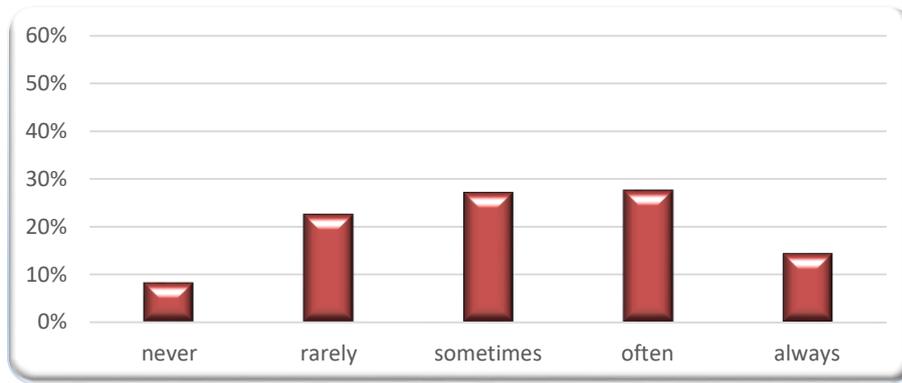


Figure 8. Level of agreement with the statement: “I prefer to use vehicles less polluting than cars” - Rome

The last sentence regarded the participation in extraordinary recycling initiatives: comparing *ex-ante* with *ex-post* answers, the number of "never" raises from 29% to 35%, in addition to a "rarely" matched now by 33% - previously it was only 24% - of the sample.

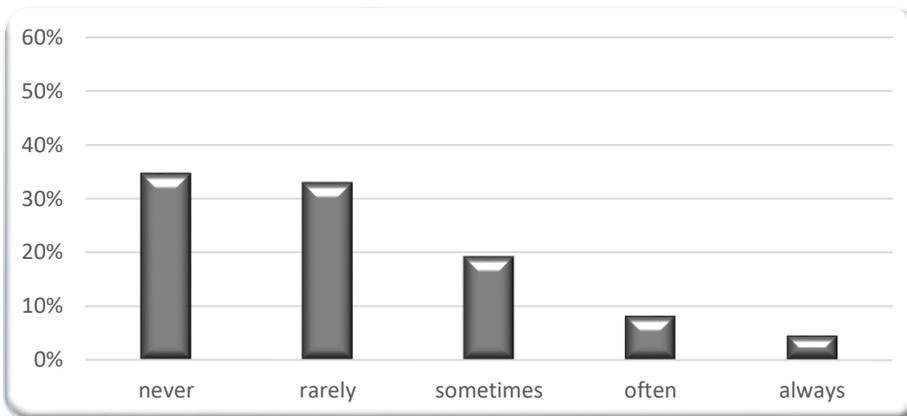


Figure 9. Level of agreement with the statement: “I participate in extraordinary recycling initiatives” - Rome

Further questions explored the current waste handling behaviour. Less than half (43%) have never been to the recycling depot, mainly due (27%) to difficulties in reaching it (i.e. no car availability, excessive distance or no time) or ignorance about its location or even its existence (16%). Almost 40% of them did not need to get there, while 12% sent other people (i.e. family member) or found another solution, such as door-to-door collection.

Among those who have been there, on average they went there 7 times travelling 8km mainly taking electrical appliances or old furniture.

In general, if recycling depot were closer, respondents would be willing to use them on average 20 times/year, for recycling also other kind of materials (90%).

Suggestions provided for improving the current recycling system includes better communication and briefing campaigns, more efficient collection processes and possible public incentives.

Model estimation

According to the previously mentioned attributes investigated, the following effects coded variables¹⁷ were used in the model:

- (1) IMPROVE (takes the value 1 if the aim of the initiative is to improve UR3 services, and -1 if charity);
- (2) ONECAP (takes the value 1 if the caps-throwing mode is one cap at a time, and -1 if more caps per time);
- (3) ENVIRON (takes the value 1 if the transport system used is environmentally friendly, and -1 if non environmentally);
- (4) PROBLOW (takes the value 1 if the probability to find boxes full is low, and -1 if high),
- (5) GAMIF (takes the value 1 if gamification is considered, and -1 if not).

The estimation run over the whole sample is shown in the next Table.

Table 6. Econometric results – ex-post analysis

Variable	Coefficient	St. Error	T-stat	P-value
IMPROVE	-.00060	.02672	-.02	.9820
ONECAP	-.05472**	.02687	-2.04	.0417
ENVIRON	.25617***	.02681	09.56	.0000
PROBLOW	-.01873	.02673	-.70	.4836
GAMIF	.07956***	.02674	2.98	.0029

Three attributes are significantly affecting the behaviour of the sample (in bold):

- caps-throwing mode (one capper time) - negatively;
- transport system used (environmentally friendly) - positively;
- gamification (yes) - positively.

Preferences are thus significantly affected by those elements, i.e. the attributes have a positive impact on the overall value of the utility function.

In particular the result related to the transport system adopted for the recycling initiative is very important, since it is the main purpose of the solution proposed: this means that it is very relevant for stakeholders.

On the contrary, the cap-throwing mode element, that is negatively significant, shows a certain reluctance in being compelled to throw only one cap per time. Indeed, the solution implemented foresaw the possibility to deposit more caps per time.

Furthermore, interviewees prefer a solution that includes gamification.

These results are in line with the output of the analogous *ex-ante* analysis. According to the following table, illustrating the *ex-ante* results, the transport system adopted and gamification kept on being very valuable to the sample.

¹⁷ For an in-depth discussion on effects coding, please see Hensher *et al.* (2015).

Table 7. Econometric results – ex-ante analysis

Variable	Coefficient	St. Error	T-stat	P-value
IMPROVE	-0.037	0.022	-0.169	0.866
ONECAP	0.012	0.022	0.526	0.599
ENVIRON	0.147***	0.022	6.735	0.000
PROBLOW	-0.0147	0.022	-0.631	0.528
GAMIF	0.084***	0.218	3.825	0.000

Compared to the previous situation, respondents, after having experienced the solution, are feeling more annoyed when they have to throw only one cap per time thus appreciating the change provided in the solution. Moreover, as regards the two attributes that were already significant in the *ex-ante* survey, it is possible to compare the marginal rate of substitution between them in the two different situations. The results show that it equals 3.24 in the *ex-post*, while 1.75 in the *ex-ante*. The rate almost doubles in the new situation, this probably due to a reinforcement of the environmental attitude rather than a reduction in the relevance of gamification (since no gamification were actually deployed).

Finally, as done in the *ex-ante* analysis, estimations have been performed dividing the sample according to the different university departments. In Table 8, the results for each of the four university departments, after they have experienced the solution¹⁸, are presented.

Table 8. Econometric results per department – ex-post analysis

Department 1 (n= 180)				
Variable	Coefficient	St. Error	T-stat	P-value
IMPROVE	-.01746	.05052	-.35	.7296
ONECAP	-.10192**	.05091	-2.00	.0453
ENVIRON	.23171***	.05085	04.56	.0000
PROBLOW	.00813	.05073	.16	.8726
GAMIF	.07749	.05041	01.54	.1242
Department 2 (n= 134)				
Variable	Coefficient	St. Error	T-stat	P-value
IMPROVE	.06280	.05336	01.18	.2392
ONECAP	-.01377	.05365	-.26	.7974
ENVIRON	.23847***	.05337	04.47	.0000
PROBLOW	.00963	.05343	.18	.8569
GAMIF	-.00398	.05392	-.07	.9411
Department 3 (n= 178)				
Variable	Coefficient	St. Error	T-stat	P-value
IMPROVE	-.02260	.05698	-.40	.6917
ONECAP	-.06006	.05725	-1.05	.2942
ENVIRON	.28719***	.05723	5.02	.0000
PROBLOW	-.07544	.05685	-1.33	.1845
GAMIF	.15978***	.05694	2.81	.0050
Department 4 (n= 105)				
Variable	Coefficient	St. Error	T-stat	P-value
IMPROVE	-.02539	.05433	-.47	.6403
ONECAP	-.03866	.05440	-.71	.4773
ENVIRON	.27831***	.05443	5.11	.0000
PROBLOW	-.02588	.05426	-.48	.6333

¹⁸ By the way, no distinction in the solution has been designed yet; i.e. the solution was always the same for all the departments

GAMIF	.09044*	.05419	1.67	.0951
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Again, as expected, the environment element turns out to be significant for all the 4 departments, while gamification seems to affect behavioural process in only 2 departments out of 4. One cap throwing is also significant for Department 1.

Even in this case, comparing this result with the *ex-ante* analysis per department, the main output, apart from a certain homogeneity – probably due to the fact that at the moment no specific distinction has been deployed between the different departments – is that the attribute related to an environmentally friendly process of distribution is still the most relevant.

Results obtained by dividing the sample, suggest that, after the implementation of solution although preferences are quite spatially heterogeneous, a wide shared *consensus* towards the application of an environmentally-friendly transportation system, which is the main innovation brought by CITYLAB project in Rome, still emerges from the estimated models. Gamification is still seen as a positive feature for two out of four departments, and the cap-throwing mode for one department. Furthermore, a low probability to find boxes full (significant for two out of four departments in the *ex-ante* estimation) has become less important after having experienced the initiative, mainly due to the fact that this phenomenon rarely happens with the new solution.

Table 9. Econometric results per department – *ex-ante* analysis

Department 1 (n= 180)				
Variable	Coefficient	St. Error	T-stat	P-value
IMPROVE	-0.024	0.039	-0.610	0.542
ONECAP	-0.069*	0.039	-1.735	0.083
ENVIRON	0.081**	0.039	2.039	0.041
PROBLOW	0.073*	0.039	1.862	0.063
GAMIF	0.035	0.039	0.897	0.370
Department 2 (n= 134)				
Variable	Coefficient	St. Error	T-stat	P-value
IMPROVE	0.094**	0.047	2.003	0.045
ONECAP	-0.051	0.047	-1.083	0.279
ENVIRON	0.161***	0.047	3.429	0.001
PROBLOW	-0.048	0.047	-1.016	0.309
GAMIF	0.162***	0.047	3.450	0.006
Department 3 (n= 178)				
Variable	Coefficient	St. Error	T-stat	P-value
IMPROVE	-0.012	0.041	-0.301	0.763
ONECAP	-0.044	0.041	-1.067	0.286
ENVIRON	0.251***	0.041	6.074	0.000
PROBLOW	0.093**	0.041	-2.274	0.023
GAMIF	0.111***	0.041	2.643	0.008
Department 4 (n= 105)				
Variable	Coefficient	St. Error	T-stat	P-value
IMPROVE	-0.069	0.052	-1.343	0.179
ONECAP	0.071	0.052	1.364	0.172
ENVIRON	0.088*	0.052	1.689	0.091
PROBLOW	-0.002	0.052	-0.044	0.965
GAMIF	0.038	0.052	0.734	0.463

3.2 Gamification

The output of the *ex-ante* Stated Choice Experiment, indicating the high potential a gamified plastic cap recycling initiative might have (CITYLAB, 2018a), led the Rome Living Lab to perform a further investigation on gamification.

A recent trend to foster sustainable behaviour change, in line with the “libertarian paternalism” vision proposed by Thaler and Sunstein (2008), foresees the use of game dynamics. This is usually referred to as “gamification”, i.e. the use of “game design elements in nongame contexts” (Deterding et al., 2011) with the intent of taking advantage of the power of game mechanics for non-entertainment purpose (Nelson, 2012). It is important to note that this soft policy approach is quite new and mostly adopted in passenger transport initiatives¹⁹.

The starting point relates to the assumption that a given gamification structure will produce different results depending on how well tailored it is with respect to players’ preferences. In other words, gamification will have greater effect on behaviour change the more its structure is developed accounting for players’ preferences.

There are two fundamental steps to gamify a given process: (1) decide what the objectives of the activity/system are; (2) use appropriate game elements to motivate players to act (Aparicio et al., 2012; Werbach and Hunter, 2012).

With the aim of providing a positive experience for the end-user, through appropriate techniques aiming at stimulating both intrinsic and extrinsic motivations, gamification should adopt a user-centred approach. Nicholson (2012) describes a high-level overview of theories adopted to inform the design of user experience in supporting intrinsic motivation²⁰. It is thus important to focus on users’ preferences to increase the potential of success of gamification. Adopting a user-centred design perspective, inspired by the human-centred scheme²¹, produces an interactive and more functional system.

Alternatively, one could simply adopt gamification instruments and procedures used in similar projects following a trial-and-error approach. This foresees a low effort in the design process, given it does not involve any *ex-ante* analysis of players’ preferences, but it is undoubtedly time-consuming in the implementation phase. In fact, it implies additional effort to change the game mechanics (e.g. different system programming).

In this case study, a theoretically-based and easy-to-implement in practice approach is proposed to maximize the potential success of gamification to be further developed. The advanced user-centred approach is based on a Stated Choice Experiment where alternative options for each structural gamification component are consistently and systematically presented to users thanks to a predetermined experimental design, so to elicit potential players’-specific preferences for gamification components. It allows to: 1) tailor the most important game characteristics in accordance with the specific gamified context, 2) align game characteristics with agents’ preferences and expectations, 3) increase players’ engagement and stimulate behavior change.

The analysis here reported aims at exploring gamification design issues leaving its implementation to a second step of the research.

¹⁹ See, for instance, CIVITAS Training: Influencing behaviour through gamification (<http://www.civitas.eu/content/civitas-training-influencing-behaviour-through-gamification>).

²⁰ Among the most relevant theoretical foundations of gamification one finds self-determination theory (SDT) aiming to explain agents’ engagement and behaviour change on the base of intrinsic and extrinsic motivations (Ryan and Deci, 2000).

²¹ The fundamental tenets of a human-centred scheme, according to ISO standards, are: (i) build the design upon a clear understanding of users; (ii) involve them throughout the process; (iii) fine-tune the design analysing users’ perceptions (ISO 9241-210).

In the CITYLAB Rome implementation, university students are the main stakeholders to be involved and thus they are the players. It is important to underline that the success of the proposed solution is linked to stakeholders’ participation to the plastic cap recycling initiative. Increasing the collection of recycled materials is the gamification objective. In fact, the more caps are collected, the more caps are recycled and dedicated trips avoided, with a reduction in kilometers travelled and CO₂ emitted to perform these activities.

A literature review performed on game mechanics design (e.g. Robson et al., 2015; Seaborn and Fels, 2015) suggests considering the following three qualitative attributes: rewarding system, point assignment mechanism and type of participation. Attribute levels selection was performed based on in-depth interviews (i.e. three experts on gamification designs were interviewed to acquire information on the typical types of game mechanics and the most suitable ones for the specific context investigated) and focus groups (i.e. four meetings, one for each University Department involved, were organized with, on average, 10 students to acquire information about their perceptions with respect to the most relevant levels for each attribute). The final attributes and levels used are: (1) “Rewarding” that can be (a) internal (i.e. badge) or (b) external (i.e. discount) to the game; (2) “Point assignment” that relates to (a) succeeding in a mission, (b) making a single “virtuous” action or (c) competing with other players; (3) “Type of participation” that can be (a) individual, (b) in teams, (c) hybrid (i.e. both individual and in team).

Following Gatta and Marcucci (2016), a multi-stage efficient design is developed using NGENE software (Rose and Bliemer, 2012), due to its advantage in producing statistically significant attribute coefficients and/or reducing the sample size needed to estimate statistically significant parameters.

Table 10. Example of a choice task.

	Option A	Option B
Rewarding	<i>Internal</i>	<i>External</i>
Point assignment	<i>Action</i>	<i>Competition</i>
Type of Participation	<i>Hybrid</i>	<i>Individual</i>
Choice	<input type="checkbox"/>	<input type="checkbox"/>

Table 11. Attributes and levels used in the SCE.

	Rewarding	Point assignment	Type of Participation
#1	<i>Internal</i>	<i>Mission</i>	<i>Individual</i>
#2	<i>External</i>	<i>Action</i>	<i>Team</i>
#3		<i>Competition</i>	<i>Hybrid</i>

Econometric results, using a sample of 532 interviews, are reported in the table below. For interpretation, it is important to recall that the model is specified using effects coding²². The impact of the base level is equal to the negative of the sum of the non-base estimated

²² Effects coding the attribute levels allows for the estimation of all levels’ effects at the cost of constraining the sum of all parameters’ values to zero. Effects coding the variables facilitates interpretation. In fact, the constant term can only reflect the utility associated with the base case alternative thus avoiding misinterpretation (Hensher et al., 2015).

parameters.

Table 12. Econometric results - Gamification

Variable	Coefficient (β)	Stand. Error (SE)	β/SE	P-value
Reward ^a				
<i>External</i>	0.233***	0.026	8.92	0.0000
Point assignment ^b				
<i>Mission</i>	0.095***	0.043	2.22	0.0262
<i>Competition</i>	-0.069	0.043	-1.62	0.1042
Type of Participation ^c				
<i>Individual</i>	-0.345***	0.058	-5.90	0.0000
<i>Hybrid</i>	0.232***	0.057	4.06	0.0000

^a base level: "Internal"; ^b base level: "Action"; ^c base level: "Team"

One can express the systematic utility (V) as follows:

$$V = \begin{cases} +0.233 & \text{if } External \\ -0.233 & \text{if } Internal \end{cases} + \begin{cases} +0.095 & \text{if } Mission \\ -0.026 & \text{if } Action \\ -0.069 & \text{if } Competition \end{cases} + \begin{cases} -0.345 & \text{if } Individual \\ +0.113 & \text{if } Team \\ +0.232 & \text{if } Hybrid \end{cases}$$

To calculate attribute importance, one can sum the absolute values of coefficient levels. "Type of Participation" (51%) is the most relevant attribute followed by "Rewarding" (35%) and "Point assignment" (14%). Results also show that: (i) external rewards are preferred to internal ones; (ii) mission is the most preferred mechanism for point assignment, while competition (i.e. winning against other participants) is the least preferred; (iii) individual participation is the least preferred option while hybrid participation the most preferred, where users play individually, but at the same time act as a team.

To sum up, a deep understanding of the behavioural aspects linked to decision-making is crucial to define and implement effective policies. Gamification is a new emerging approach to foster engagement and behavior change. However, gamification *per se* is not necessarily capable to induce the desired results but needs to be tailored according to users' preferences. To this end, a user-centred design technique is proposed to structure a gamification process. The approach rests on SCEs, to elicit players' preferences towards various structural gamification components and to identify their quantitative optimal combination, instead of simply trying different structures to achieve a satisfying result.

In conclusion, thanks to the knowledge acquired, one can define the overall most preferred gamification structure mix, which will likely generate the highest engagement and thus induce positive behaviours.

4 Conclusions on *ex-post* behavioural analysis

The first part of this deliverable focused on the impact of the CITYLAB solution.

In particular, it explored any behavioural change among stakeholders, i.e. any difference in the stakeholders' perceptions after they have experienced the solution; their willingness to pay for it is also investigated. To this aim, an *ex-post* behavioural analysis was performed, whose results have been compared to those of the *ex-ante* survey that has already been carried out and described in Deliverable 2.2.

The data comparison between *ex-ante* and *ex-post* surveys, turns out to be crucial, although not easy to cope with.

Indeed, after the on-field implementations, both in the cases of Brussels and Rome, it is possible to notice a higher degree of acceptance of the CITYLAB solution among stakeholders, a positive (stated) behavioural reaction to the solution, and an increased willingness to pay for having the solution implemented.

Furthermore, as regards the solution itself, the learnings coming from the *ex-ante* analysis can be reinforced.

Actually, in the case of Brussels this stated behavioural change must be tread carefully, since the small number of participants in the *ex-post* behavioural survey does not allow to generalize the results: not only critical points seem to be the same before and after the implementation, but also the final result, in terms of the very few orders online, i.e. the real behaviour/attitude towards the solution is disheartening, thus forcing Procter&Gamble to rethink its proposal.

On the contrary, in Rome the enthusiasm for the initiative was very high since the beginning, so that the results of the *ex-ante* analysis suggested a further investigation by means of a Stated Choice Experiment.

In particular, the comparison between *ex-ante* and *ex-post* analysis shows that respondents are now more aware of the characteristics of the experiment and believes in its financial self-sustainability; moreover, they are convinced that a big behavioural change is needed for the solution to be effective, while the solution can remain the same, as long as it is duly promoted.

Indeed, the poor information about the initiative and the collection system itself turns out to be the most critical point, together with an inefficient collection system in terms of emptying frequency and number and size of bins.

Nevertheless, they are willing not only to adopt the proposed solution in the long run and to recommend it to other people but also to pay (more) for it.

Lastly, even the Stated Choice Experiment *ex-ante/ex-post* comparison proved that there has been a certain increase in the respondents' environmental concern, even for each department considered; nevertheless, again, the stated behaviour seems more "green" than the actual/real one. To this aim, the gamification impact on the behaviour of stakeholders involved could result in a good, accepted and effective strategy.

PART II. Behavioural analysis for transferability of solutions

It is widely acknowledged that cities in the world are different, thus offering different conditions in terms of support and constraint for innovative measures; nonetheless, some transferability of solutions can be tested, especially in same or close rank cities (i.e. cities which hosts sets of similar functions): this can be helpful in facilitating the usage and the success of one measure in different cities.

As it has already been mentioned, the *ex-ante* behavioural analysis carried out in each Living Lab (CITYLAB, 2018a) aimed at exploring stakeholders' perceptions and evaluating the degree of acceptance of the CITYLAB solution in order to identify barriers and/or opportunities for its implementation.

As a general consideration, one has to take into account that stakeholders' response could also be affected by local characteristics and policies. Therefore, the evaluation of the potential of a CITYLAB solution to be successfully transferred to other cities turns out to be a pivotal point. Actually, given the importance of this issue, not only transferability perceptions, together with upscaling ones, have been asked to respondents in the *ex-ante* survey questionnaire²³ (CITYLAB, 2018a), but also the assessment of potential roll-out of CITYLAB solutions to other CITYLAB living labs, has been deeply investigated in Deliverable 5.6 (CITYLAB, 2018b)²⁴.

Within this context, the second part of this deliverable explores the possibility to transfer the solutions implemented in the various Living Labs, under a behavioural perspective, i.e. by analysing stakeholders' perceptions. To this aim, the *ex-ante* survey performed in each given Living Lab was replicated in another Living Lab. Couples of matching cities were chosen so that each solution is tested in one city only and, at the same time, each city only tests one different solution. Furthermore, other interested cities were directly involved by some Living Labs for replicating their survey.

The main idea is to compare the results of the *ex-ante* questionnaires about the same proposed solution in different cities, so to investigate, from a behavioural point of view, if and how the CITYLAB implementations could be transferred and scaled to other cities and consequently analyse its potential adoption and success elsewhere.

Questionnaires have been slightly changed in order to fit the new context and to allow for comparable data. Moreover, comments from the local Living Labs involved were also collected to integrate the comparison from a behavioural perspective and to better interpret the output of the analyses.

The comparison between the results of the *ex-ante* survey in the matching cities is mainly focusing on the different degree of acceptance of the CITYLAB solution among stakeholders. Stated behavioural reaction to the solution and willingness to pay for it are also investigated.

The second part of this Deliverable 5.5. is thus structured as follows.

Chapter (5), after a brief/short description of the methodology used, present the results of the analysis performed in the 7 CITYLAB Living Lab cities (Amsterdam, Brussels, London, Oslo, Paris, Rome and Southampton) replicating other Living Lab surveys. Chapter 6, instead, shows the results of the analysis furtherly carried out in Antwerp (replicating the proposal of Brussels) and in Milan (replicating the Rome proposal). Chapter 7 follows, providing some overall conclusions on the transferability of CITYLAB solutions among different cities from a behavioural perspective.

²³ Specifically, in the Section G of the questionnaire, they had to state their opinion on the possibility to expand – both physically (enlargement) and as a process (replicability) – the solution in other areas or companies, or aspects of delivery, or materials (CITYLAB, 2018a).

²⁴ CITYLAB Deliverable 5.6 explores to what extent the seven solutions may be successfully transferred from their original implementation city to other CITYLAB cities.

5 Transferability within CITYLAB Living Labs

In this chapter the transferability of the solutions within the different Living Labs is explored and discussed, with a specific *focus* on behavioural aspects. Differences in stakeholders' preferences and their willingness to pay for the CITYLAB solutions are investigated.

To this aim, the *ex-ante* behavioural analysis performed in a given Living Lab city has been carried out in a different Living Lab city and, subsequently, the results of the two cities have been compared and commented.

In order to evaluate the results of the *ex-ante* analyses carried out in the couple of matching cities, only few adjustments were made in the new questionnaire.

The creation of “couples of matching cities”, i.e. the city where to replicate a given solution implemented in another city, follows a specific approach so to guarantee that: (i) each Living Lab has to perform only one survey; (ii) each case must be replicated only in one other case.

For each Living Lab city, the corresponding “replicant” city has been identified according to a choice process based on three criteria:

1. outcomes of the transferability analysis performed in CITYLAB (2018b)²⁵ were used as starting point;
2. each Living Lab had to express its own interest in replicating the behavioural analysis of the implementation carried out in any other city, i.e. the specific solution (currently proposed in another Living Lab) it would like to adopt (Figure 10, Table A);
3. each Living Lab had to indicate its suggestions about the most appropriate city where to replicate the behavioural analysis for the solution deployed, i.e. the city where to replicate its own solution (Figure 10, Table B).

While for criterion 1 the methodology adopted was based on TIDE (2013) with some adjustments in terms of reduction to the urban scale and focus on logistics, for criteria 2 and 3, Living Labs have to state their preferences using a 6-points Likert scale, ranking options from 1 = “most interesting/suitable” to 6 = “least interesting/suitable”.

Figure 10 provides an example (Amsterdam case) of the Living Lab choice process. White cells must be filled in with the rank; grey cells grant that a city is not evaluating itself.

Table A - Please rank the LLs in terms of your interest to replicate their ex-ante analysis (from 1 “most interesting” to 6 “least interesting”)

	AMS
AMS	
BRU	
LON	
OSL	
PAR	
ROM	
SOU	

Table B – Where do you think your ex-ante analysis could purposely be replicated? Please rank the LLs (from 1 “most suitable” to 6 “least suitable”)

	AMS	BRU	LON	OSL	PAR	ROM	SOU
AMS							

Figure 10. An example of Living Lab choice process (Amsterdam).

Figure 11 and Figure 12 show the results obtained with respect to criteria 2 and 3, respectively.

²⁵ The transferability methodology adopted was based on TIDE (2013) with some adjustments in terms of reduction to the urban scale and focus on logistics.

cr2		Replicated in:						
		AMS	BRU	LON	OSL	PAR	ROM	SOU
Ex-ante analysis performed in:	AMS		1	3	3	3	1	5
	BRU	4		6	4	1	2	6
	LON	1	2		2	2	3	2
	OSL	2	4	2		5	5	4
	PAR	6	3	1	1		6	3
	ROM	5	6	5	6	6		1
	SOU	3	5	4	5	4	4	

Figure 11. Results of criterion 2

		Replicated in:						
		AMS	BRU	LON	OSL	PAR	ROM	SOU
Ex-ante analysis performed in:	AMS		1	3	2	5	4	6
	BRU	4		1	5	2	3	6
	LON	3	6		2	1	5	4
	OSL	2	4	1		3	6	5
	PAR	3	1	2	5		6	4
	ROM	5	2	3	4	6		1
	SOU	5	6	1	3	4	2	

Figure 12. Results of criterion 3

As a result of this process, i.e. by combining the three criteria described above, 7 couples of matching cities, where the same solution has been evaluated throughout an *ex-ante* behavioural survey, were identified.

The one-to-one matrix in Table 13 illustrates the “couples” of matching Living Labs.

Table 13. Replicability Matrix output

		Replicated in:						
		AMS	BRU	LON	OSL	PAR	ROM	SOU
Ex-ante analysis performed in:	AMS						↗	
	BRU					↘		
	LON				↖			
	OSL							↖
	PAR		↖					
	ROM			↖				
	SOU	↖						

According to this output, results of each “replicated” analysis are presented in what follows. A comparison with the results of the *ex-ante* surveys carried out in the original Living Lab cities is also provided.

5.1 Amsterdam replicating Southampton: Joint procurement and consolidation for large public institutions

The proposed solution in Southampton Living Lab aims at reducing the freight impact generated by large municipal organisations (universities, hospitals, city council) by rationalising their purchasing behaviour and using the Southampton Sustainable Distribution Centre (SSDC) on the outskirts of Southampton²⁶.

The replicating idea is to use a Sustainable Distribution Centre on the outskirts of Amsterdam, so that all goods can be consolidated off-site and delivered by one or more vehicles at times to suit hospital departments and clinics.

The survey investigates the possibility to transfer in Amsterdam this innovative solution from a behavioural point of view; to this aim, one employee of the hospital logistics department has been interviewed.

Perceptions of present situation

This section included questions related to the perception of present situation. According to the answer provided, the service is not perceived as inefficient. Actually, when asked if the present system regarding the delivery of goods to the hospital is well organised, the interviewee marked “Somewhat agree”. She also highlighted two critical aspects to be considered about the system: the “amount of goods to handle” and the “timing of deliveries due to congestion”.

Evaluation of solution proposed

Asked about acceptability and feasibility degrees of the proposed initiative by selecting the preferred option with a tick, the interviewee seems to have some doubts, especially about the financial viability of the solution; she only agrees about the implementation being “environmentally beneficial” and “somewhat agrees” about its technical feasibility.

Table 14. Evaluation of the proposed solution – Amsterdam

	Extremely disagree	Disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Agree	Extremely agree
<i>Individually acceptable</i>				✓			
<i>Technically feasible</i>					✓		
<i>Financially viable</i>			✓				
<i>Environmentally beneficial</i>						✓	
<i>Socially desirable</i>				✓			

✓ shows the selected option by the respondent.

Stated behavioural reaction to the proposed solution

²⁶ See CITYLAB (2018a), Chapter 6.7.

What importantly emerged from the last part of the questionnaire is that the interviewee is not willing to pay to have this solution implemented; on the contrary, logistics companies have eventually to be charged, while subsidies could be provided by government.

Upscaling and transferability perceptions

A further investigation relates to the possible transferability of the initiative to cover other areas or aspects of delivery; in this case, the interviewee agreed on the possibility/opportunity to extend the solution to hospitals with various locations at low accessibility level.

Suggestions

Possible suggestions were asked to the respondent. Here, the hospital logistics operator points out that such a distribution centre “should manage flows of multiple hospitals from an easy accessible location in order to show benefits”. In addition, since the hospital is centralised and is already efficiently handling high volumes of goods, this issue is not considered a priority.

Awareness and importance of the issue

In the very last section of the questionnaire, the respondents’ willingness to take part in a Living Lab to co-create an effective and financially sustainable solution is explored

The interviewee didn’t provide any reasons for participating in, neither did she provide reasons preventing from participating in the project; instead, she found the hospital staff’s saving time in delivery more relevant than the environmental aspects (congestion and pollution) related to the initiative.

Table 15. Importance of the issue – Amsterdam

	Extremely irrelevant	Irrelevant	Somewhat irrelevant	Neither irrelevant nor relevant	Somewhat relevant	Relevant	Extremely relevant
Initiatives to reduce time spent by hospital staff associated with parcel delivery						✓	
Initiatives to reduce numbers of delivery vans visiting the hospital					✓		
Initiatives to reduce the hospital’s carbon footprint					✓		

✓ shows the selected option by each respondent.

Transferability: Amsterdam vs Southampton

Comparing the results of the two *ex-ante* analyses²⁷ carried out about the same solution for rationalising purchasing behaviour in two different cities, some considerations have to be pointed out.

First of all, both interviewees are hospital representatives; they belong, instead, to two different department: financial one for Amsterdam, logistics for Southampton. Therefore, they play a different role (more general the first, more specific the second) and this has to be taken into account when comparing the results. Furthermore, in the city of Southampton there is already

²⁷ For details on Southampton analysis see CITYLAB (2018a), Chapter 6.7.

a sort of shared joint procurement among stakeholders which enhances interest on the topic and the involvement of the community.

Both respondents “somewhat agree” about the efficiency of the delivering current system in their hospitals, pointing out the impact on patients, in terms of time; costs are to be reduced, and partnership to be enlarged, according to the Southampton manager.

Despite this homogeneity in assessing the current situation, the two operators show a very different level of enthusiasm towards the solution; specifically, the representative in Amsterdam is not as convinced as his colleague in Southampton, which trusts quite completely the initiative. Nevertheless, in both cases, the financial viability seems to represent the most critical point.

Furthermore, the different thought is reflected by the opposite response in terms of willingness to pay for having the solution realised: Amsterdam respondent only thinks that others (logistics operators) should pay, possibly subsidized by public sector.

Accordingly, while Southampton would adopt the solution in every department of the hospital, and in other activities of the region, Amsterdam would assign it only to some specific less accessible units of the hospital, since it believes that such an institution has got other priorities.

Lastly, the wider perspective of the Southampton hospital may be granted by the already existing partnership on this topic. Suggestions are provided in terms of enlarging it while reducing costs, both financial and environmental. Time, again, plays a key role, since a delivery and service plan is expected.

In conclusion, the analysis performed casts some doubts, from a behavioural perspective, on a possible successful adoption of the Southampton solution in Amsterdam.

5.2 Brussels replicating Paris: Logistics hotels to counter logistics sprawl

The proposed solution in Paris aims at reducing negative consequences of logistics sprawl, as vehicle emissions, noise and congestion at entry points of dense urban areas, through logistics hotels and transition to cleaner modes of transport.

The replicating idea is to provide a logistics hotel located in Brussels, with the use of electric vans for final deliveries, offering to transport companies the possibility to relocate their consolidation centres and cross dock terminals in this logistics hotel.

The survey investigates the possibility to transfer in Brussels this innovative solution from a behavioural point of view; to this aim, representatives of the express parcel transport companies that might be interested in the use of the logistics hotel have been contacted, but they did not accept to participate in the survey, apparently because not interested in the solution. In order to overcome this problem, a representative of Colruyt – a non-food retailer that makes home deliveries to consumers ordering online although it does not have retail outlets in the region - has been interviewed. Due to the changed nature of the respondent (a supermarket operating their own warehouses and partly outsourcing transport instead of a logistic service provider) the survey questionnaire was modified accordingly²⁸.

More specifically, small deliveries (parcels) are outsourced to a Courier, Express and Parcel (CEP) company, which transports volumes by trucks from a warehouse close to Brussels to their warehouse inside the city. On the contrary, larger volume orders (XXL) (e.g. fridge, matress, etc.) are delivered by the retailer himself on roundtrips, that are not dedicated, to Brussels. Concerning online orders delivered in Brussel Capital Region (BCR), about 1 out of 4 is delivered on one's own/*in-house* being the others outsourced to the CEP company.

According to this, the retailer evaluated the 'logistics hotel' solution as if they had outsourced their XXL deliveries to a transport company that operates an additional warehouse close to Brussels in a logistics hotel; thus, the characterisation of present behaviour (below) is for the XXL volume of the retailer and does not consider their parcel volume²⁹.

Characterisation of present behaviour

This section depicts the current situation in terms of the respondent's behaviour. First of all, it is useful to underline that the delivery tour is not dedicated to Brussels, because it is a roundtrip of about 350 kilometres in the central part of Belgium. Every day it uses 1 or 2 contractors for final deliveries in Brussels, representing 1 out of 13 drivers, 1 out of 50 employees of the logistics activity XXL, 1 out of 190 employees of the activity online logistics.

Focusing on the characteristics of the vehicles used to deliver in Brussels, also considering contractors making the final deliveries, it could be a EURO6 van or lorry, depending on the required vehicle capacity; no electric or natural gas fuelled vehicle is in the fleet.

²⁸ The dual nature of the solution in Paris, where two different locations and types of logistics hotel were evaluated (see CITYLAB 2018a), allowed for this change in the stakeholder's role. Actually, while in Beaugrenelle, the logistics company was supposed to operate the logistics hotel (at a lower cost because of the government support), the solution in LaChapelle, dealt more with integrating logistics hotels in new large developments. According to this distinction, the first version of the survey, for interviewing a parcel operator, focused on the different operating system from an urban or suburban terminal; to this aim, Beaugrenelle was chosen as the best example. Since the case of LaChapelle also involved stakeholders other than logistic service providers, such as retailers, it became now the new benchmark.

²⁹ Besides, they do not have good data for the parcel volume since it is outsourced to the CEP company.

Perceptions of present situation

In this section, respondents had to express their agreement with the statement “Present service is well organised”, and then eventually point out any critical aspect they find in present situation. The Likert scale went from “Extremely disagree” to “Extremely agree” through seven degrees of agreement. Due to the special nature of the respondent, two answers were provided to the first question, depending upon its role: from a customer perspective, the service is well organised and they get a fast and good service (agree option); conversely, from the retailer’s perspective, the service is less well organised because operational costs are still high (disagree option).

Among the critical points, the respondent identifies congestion and events and public works limiting the traffic flows, access restrictions for vehicles and lack of parking space to unload shipments, the trade-off between wasting time in delivering at the right store and the quality level reduction of service in not delivering at the right store. Moreover, since the driver is the face of the company while delivering, a brand image problem could also occur.

Evaluation of solution proposed

The retailer was asked to evaluate the ‘logistics hotel’ solution as if it outsourced all business-to-consumer deliveries in BCR to a CEP company that operates an additional warehouse close to Brussels in a logistics hotel. The assumption is that CEP would then combine its regular volume to be delivered in the BCR with that of the retailer. Specifically, the small parcels are shipped from a warehouse located 20 kilometres from Brussels city-centre, while the large shipments are picked-up from a warehouse located 82 kilometres from Brussels city-centre.

Table 16. Evaluation of the proposed solution – Brussels

	Extremely disagree	Disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Agree	Extremely agree
<i>Individually acceptable</i>	✓						
<i>Technically feasible</i>			✓				
<i>Financially viable</i>	✓						
<i>Environmentally beneficial</i>			✓				
<i>Socially desirable</i>				✓			

✓ shows the selected option by each respondent.

Given the limited number of shipments currently transported into the BCR by the retailer, there does not seem to be any added value to the solution from its individual perspective; it would be rather more expensive and less sustainable because of additional transshipment.

As regard the technical feasibility, it is worth highlighting that the retailer did not consider the solution with supply by rail, since the warehouses of the retailer currently do not have direct rail access, but only by truck. Even in this case, it “somewhat disagrees” because of the lack of electric vehicles able to transport large shipments in the market. Moreover, material handling of XXL items is not a standard procedure as well.

The financial viability of the solution is put in doubt because of the high prices not only for centrally located land and real estate required for those large goods, but also for electric vehicles. Furthermore, it appears very difficult to consolidate efficiently so large shipments of retailer with smaller parcels in the currently used vehicles. Finally, supplementary transshipment could imply additional material handling.

Due to the already mentioned scepticism towards rail and/or electric vehicles usage and the possibility to consolidate such large shipments, no environmental benefit is expected. Rather, even taking into account that warehouses of CEP companies in Belgium are all located close to Brussels, since the current tour dedicated for the central parts of Brussels has 14 stops on average (because of the large shipments), replacing it by transporting these volumes into Brussels first and then do a trip inside Brussels could probably even slightly increase the number of kilometres, depending on the volume that can be transported during the trip back to the warehouse of the retailer. That could be the reason for the “somewhat” disagrees option checked by the retailer. Lastly, no impact on driving conditions for drivers is supposed to occur.

Stated behavioural reaction to the proposed solution

Behavioural reactions were firstly investigated in terms of willingness to pay.

The retailer would not accept an increase of its costs, unless this increase can be regained otherwise, for example, with a reduction in current kilometre charge due to the increased sustainability of the solution. Likewise, without awareness and incentives, neither consumers are expected to be willing to pay extra for this type of solution.

Other questions explored the behavioural reaction of the retailer³⁰. According to the respondent, the solution could decrease the total number of vehicle kilometres, but only in case of real consolidation of volumes of different clients of the CEP company. Nevertheless, asked about the possibility to change transport modes to reach the new urban terminal, the retailer negatively answered, underlining that it is not possible to shift to rail or barge because the current warehouse do not have access to rail or water.

Upscaling and transferability perceptions

Respondent thinks it would be possible to extend this system to more operators delivering in Brussels, provided that multiple CEP companies – already located close to Brussels - consolidated their volumes in one logistics hotel. The same condition holds for granting the possibility to transfer and implement this organisational arrangement and infrastructural investment in other Belgium cities or elsewhere. Indeed, it would also enable CEP companies to decrease the costs of using a logistics hotel, especially those covering for expensive environmentally friendly vehicles.

Suggestions

Again, the collaboration between CEP companies when warehouses are already located close to the city-centre turns out to be the main suggestion.

Awareness and importance of the issue

Finally asked about the main motivations for participating in a logistics hotels initiative, in addition to the stronger collaboration among CEP companies to get a higher consolidation level, the respondent hopes to have retail outlets in BCR and/or increased business-to-consumer volume for the BCR and to get a sustainable license to operate in cities. Furthermore, it wishes for customers to be more aware that the demand for short lead-times and flexibility has its impact on costs, environment, health and work conditions.

Accordingly, it considers relevant the initiatives to reduce freight vehicle-km in Brussels, to promote the use of clean delivery vehicles and to improve goods consolidation and operational efficiency through urban logistics terminals.

³⁰ The last two questions/answers of this section were skipped because of the fact that a retailer – and not a CEP - is answering.

Transferability: Brussels vs Paris

Due to the different nature of respondents, in this case it is difficult to compare the survey results between Brussels and Paris, therefore caution must be adopted. However, useful information have been acquired reinforcing the arguments for enlarging the stakeholders' set and perspective, including shippers and receivers. Moreover, in a wider perspective, despite their different nature, respondents seem to evaluate the initiative quite similarly, especially as regards financial and social aspects,

5.3 London replicating Rome: Integration of direct and reverse logistic flows

The proposed solution in the Rome Living Lab aims at improving clean waste collection in order to increase the amount of recycled materials, while also minimising the amount of transport-related CO₂ emissions. Specifically, an innovative system for integrating direct and reverse logistic flows in the urban area had involved the national postal operator and the University of Roma Tre.

The replicating idea is that an eco-friendly system for collecting recyclable materials at the University is made available. The national postal operator, while delivering mail/parcels to the addressee, picks up the (full) boxes directly from the addressee during its transportation route and delivers them to the central collection point, with the aim of both increasing recycling and reducing transport negative externalities by avoiding dedicated trips.

This survey aims at investigating the possibility to transfer in London this innovative solution from a behavioural point of view; to this aim, information among 7 students and 2 researchers of the University of Westminster (London) has been collected.

Perceptions of present situation

In this section respondents have to show their level of agreement with the following statement: “The present system for collecting recycling materials at the University is well organised”. The current situation, which includes the recycling of standard products, like paper and packaging, bottles and cans, is considered as quite *well organised* by 66% of the sample; while 22% of the respondents has not a clear opinion, only one considers the system as very inadequate.

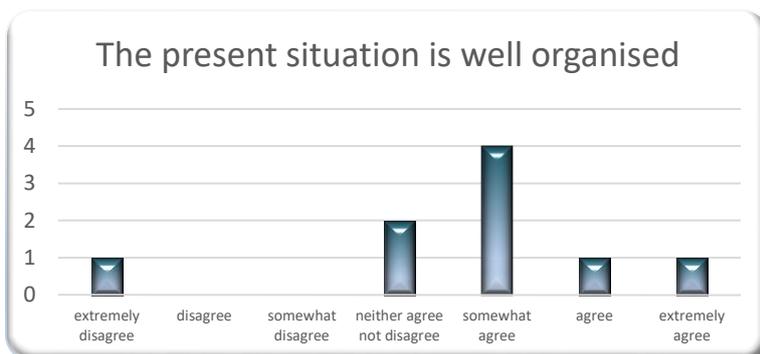


Figure 13. Perceptions of present situation - London

The main critical issues related to the *status quo* situation are:

1. the lack of separation among different recycle goods³¹ and the lack of bins for food waste;
2. the placement of bins, their design, and information on how to use them;
3. a poor coordination among many purchasing managers taking different decisions for different return logistics service providers;
4. the costs attached to the vans running empty to the university to collect the recyclable materials.

³¹ There are only bins for paper where people throw other recycling materials like plastic and glass.

Evaluation of solution proposed

The innovative solution proposes that the national postal operator, while delivering mail/parcels to the addressee, picks up the (full) boxes directly from the addressee during its transportation route and delivers them to the central collection point.

Respondents were asked to state their level of agreement (from *extremely disagree* to *extremely agree*) on 5 different characteristics of the new solution.

Figure 14 shows the opinions on individual acceptability emerging from the interviewees: none explicitly disagree, while most of the respondents (89%) at least “*somewhat agree*”.

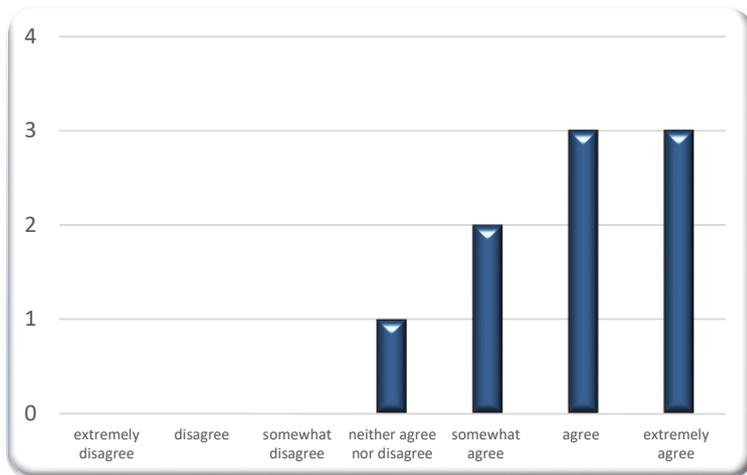


Figure 14. Level of agreement on the individual acceptability of the solution – London

Similar results emerge with respect to perceived technical feasibility (Figure 15) and financial viability (Figure 16) of the new solution, its beneficial impact on environment (Figure 16) and social desirability (Figure 18), showing a general agreement on the good perception and evaluation of almost every aspect considered.

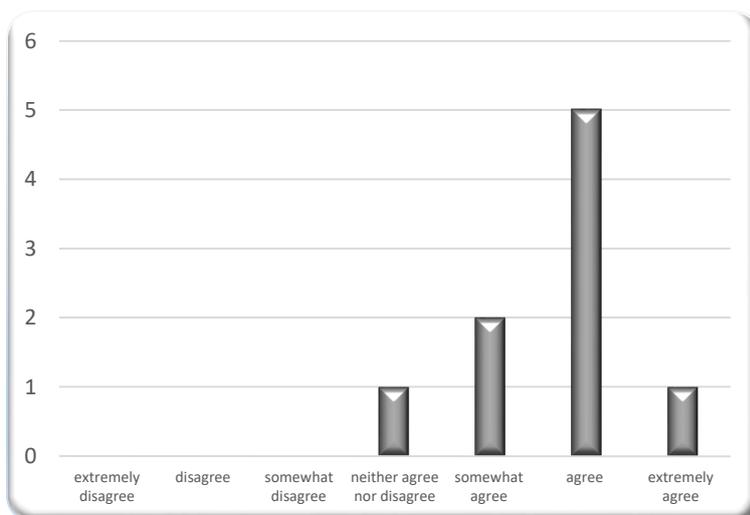


Figure 15. Level of agreement on the technical feasibility of the solution – London

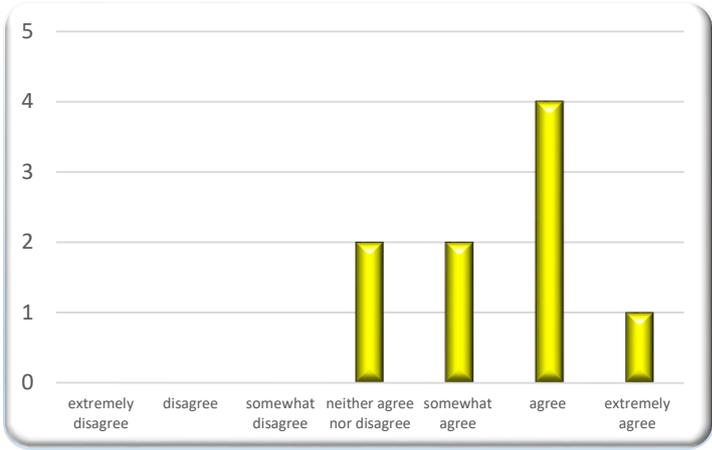


Figure 16. Level of agreement on the financial viability of the solution – London

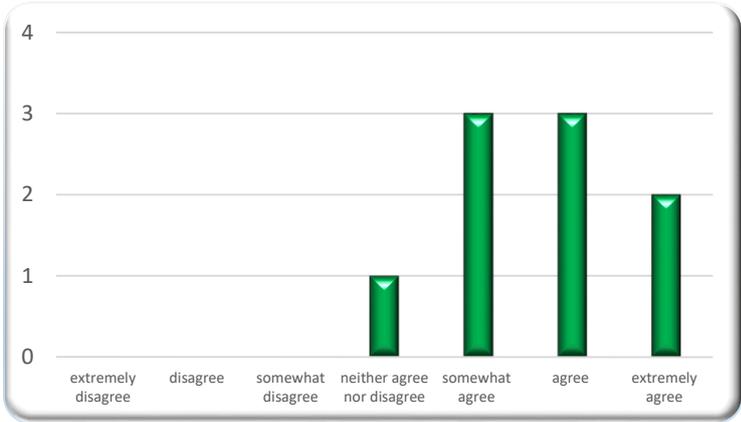


Figure 17. Level of agreement on the beneficial impact of the solution on the environment – London

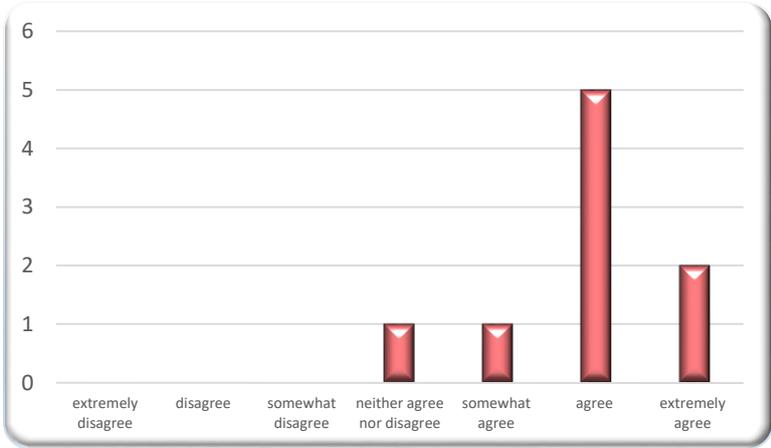


Figure 18. Level of agreement on the social desirability of the solution – London

Stated behavioural reaction to the proposed solution

This section of the questionnaire investigates the interviewees' willingness to pay for the proposed solution and their stated behavioural reactions.

As regard the first question, only 1/3 of the respondents is willing to pay; the indicated amount ranges from 5€/month to 10€/trip passing through a *una tantum* 5£.

62.5% of the sample states that others should pay, i.e. government and/or university for the new solution to be implemented; one respondent identify the whole population (over 18 years old), companies and departments, but also suggests that the costs could be borne using the savings generated by the initiative.

Almost all the respondents (8/9) would participate and collect recycling materials but not all of them (5/8) would collect more materials than the current amount. Lastly, a little bit more than the half of them (55%) would try to involve more people in the initiative.

Upscaling and transferability perceptions

Interviewees show an overall optimism with respect to the: (i) likelihood that the proposed solution, by increasing the number of people involved in the initiative, would increase the number of recycling materials collected (89%), also due to an increasing of awareness among citizens and tourists; (ii) possibility that the system could be extended outside the University (100%), e.g. to companies and other large buildings (hospitals, public sector buildings, shopping centres, sports stadium, other universities) or in the street; (iii) possibility that the system could be extended to other recyclable materials (89%), like waste food and electronics.

Suggestions

The general enthusiasm towards the initiative is confirmed by the amount of suggestions provided in the last section. Interviewees indicate possible extensions of the initiative to other logistics service operators and proposals to improve the system, from general considerations (e.g. motivation for the initiative, sponsorship) to more detailed ones both for collection points (e.g. detailed information about bins location) and the delivery service (e.g. avoiding work overtime for the driver and re-organization of the working people, since the two services are different).

Awareness and importance of the issue

The last section investigates the awareness and the importance of recycling. This part foresees open answers about the motivations for participating in recycling initiatives.

Interviewees mainly show general positive propensity towards environmental issues and research results. Efficiency and new business models also prove to be important in order to get involved in a Living Lab project.

Recycling, possibly associated to charitable or environmentally friendly initiatives, is considered at least relevant³² for almost all respondents (Figure 19), thus confirming the relevance of the issue investigated.

³² The Likert scale used is articulated in 7 levels, namely: *extremely irrelevant, irrelevant, somewhat irrelevant, neither, somewhat relevant, relevant, extremely relevant*.

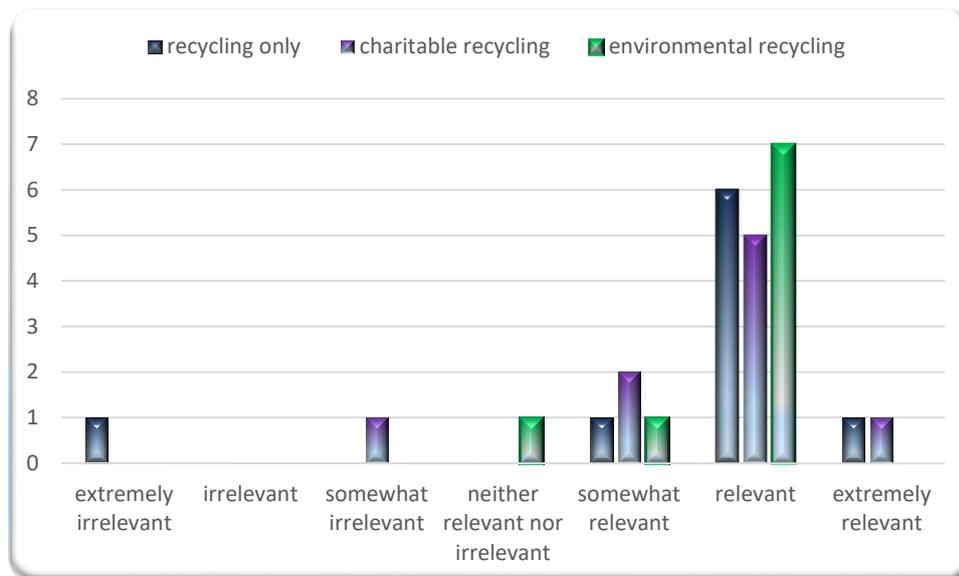


Figure 19. Importance of recycling initiatives by typology - London

Transferability: London vs Rome

First of all, it is worth underlining that, while in the University of Roma Tre (UR3) a specific recycling initiative has been taken as the *status quo* for the implementation of the CITYLAB solution, no similar action currently exists in the London case. Actually, at the Westminster University, recycling includes only the standard products such as paper, plastic and aluminium. Due to this, some specific results can't be directly compared.

The sample composition is a little bit different in the two cities, since in London most of the respondents are students, while in Rome they are administrative employees.

London respondents are mostly satisfied with the present system for collecting recycling materials at the University, complaining about the lack of bins for food waste and suggesting a better placement of bins, design, and information on how to use them; they also consider the costs attached to the trucks running empty to the University to collect the recyclable.

Specifically, referring to the plastic caps initiative in Rome, the present situation is considered as *well organised* only by 25% of the sample, the opposite is true in 37% of the cases, while the left 38% has not an opinion (CITYLAB, 2018a), showing a general lack of information about the initiative and the collection system itself. Even in this case, more information seems to be needed.

In both cities the solution always appears individually acceptable, technically feasible, socially desirable and environmentally beneficial; none explicitly disagrees, and only in London some neutral opinions were provided. If a general agreement on the good perception and evaluation of almost every aspect considered is common to the two cities, in Rome respondents are more enthusiastic about the environmental positive impact of the solution, ticking the strong agreement option more than the others, and a little bit more sceptical about its financial viability.

Probably due to the more specified solution design, 2/3 of the respondents is willing to pay in Rome, compared to 1/3 in London. In both cases, on average, they would spend about 60€/£ per year, confirming the perceived importance of the initiative, the trust in the environmental benefits and the worries about the *financial viability*. Others supposed to pay in UK were identified: government and/or university, or the whole community (population over 18 years old, companies and departments).

Interestingly, most of the sample would participate in the collection process; nevertheless, in Rome less than the half would increase the recycled materials amount. Additionally, all

interviewees will try to involve more people in the initiative only in Rome, this percentage reduces to little more than the half in London. Charity does not seem to be crucial, maybe due to the scepticism on the self-sustainability of the solution.

In both cities interviewees are convinced that the proposed solution would increase the number of people involved in the recycling initiative and that the system could be extended to large buildings (schools, hospitals, city departments public sector buildings, shopping centres, sports stadium, other universities) and neighbourhoods, companies, *via* awareness campaigns among citizens and tourists. Other materials could be collected, e.g. waste food and electronics, and other logistics service operators should be involved.

Final comments underline the need for better information both on the campaign purposes and the usage of bins, suggesting that costs could be borne finding out sponsorships or using the savings generated by the initiative, with no additional burden for the (reverse) logistics operator which already operate in direct logistics.

Lastly, almost all the London and Rome respondents considered relevant or extremely relevant to participate in recycling (collection), possibly associated to charitable or environmentally friendly initiatives, providing as motivations: a positive propensity towards environmental issues in both cities, charitable initiative in Rome, research results, efficiency and new business models in London.

As regards charity-aimed recycling initiatives, both in London and Rome, only one respondent is not convinced (neutral or judging it only somewhat irrelevant, respectively), providing a useful information for the sustainability of the business model; actually, whenever the charitable destination of the funds is removed, additional financial resources can be used for implementing the solution.

In conclusion, despite the different solutions in the two cities and the fact that in Rome it was more “tangible” than in London, the main learnings of this replicability attempt are:

- the concern for the self (financial) sustainability of the initiative, that could be improved by possibly sacrificing the charitable initiatives;
- the need for more information about the initiative among the involved community;
- the high probability of a successful transferability of the solution in London, due to the fact that respondents seem to appreciate it in a very similar way.

5.4 Oslo replicating London: New distribution models and clean vehicles

The London Living Lab develops a viable business model for last mile deliveries in busy city centre locations, with a reduced carbon footprint and improved efficiency. It is based on a joint delivery scheme where a large carrier (TNT) and a small and green (i.e. using electric vehicles) 'last-mile' carrier (Gnewt Cargo) are supposed to co-operate, with the support of the local government (Transport for London).

The replicating idea is that a big transport operator will deliver its parcels to another operator owning a depot in central Oslo; the latter will then make the final deliveries to customers using electric vehicles.

The survey investigates the possibility to transfer this innovative solution to Oslo from a behavioural point of view. An *ex-ante* behavioural analysis is performed by administering questionnaires to three representatives of the companies and institutions involved (namely a big transport operator, a small transport operator and the municipality of Oslo).

Characterisation of present behaviour

The current situation could be described using the answers provided to the following questions: 1) the number of parcels going currently through the depot in the city centre; 2) characteristics from the vehicles (model, fuel, etc.) used to deliver from the depot; 3) the kilometres transported *per* week by these vehicles. Neither the large nor the small logistics operator provided any information about the actual number of parcels going through the central depot (volumes seemed very difficult to estimate); the typical vehicle used by both operators is diesel fuelled (e.g. Mercedes, Renault or Volvo), Euro V or VI. According to the large operator rough estimates (using 15 vehicles to distribute between depot and Oslo city centre), in a week on average, they travel 200 - 500 km, with a consequent consumption of about 40 - 100 litres of diesel. With respect to this section, the municipality of Oslo was not expected to answer; nevertheless, they specified they have "some electric vans for internal transport between different agencies".

Perceptions of present situation

Concerning the parcel delivery system organization and efficiency, the logistics operators are quite indifferent/neutral; only the Municipality seems dissatisfied with the current situation.

Table 17. Perceptions of present situation - Oslo

	Strongly disagree	Disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Agree	Strongly agree
Current system is well organised and efficient		✓		✓✓			

✓ - big operator; ✓ - small operator; ✓ - Municipality.

In particular, respondents also pointed out that the main critical aspects of the current system are related to congestion costs (both logistics operators), low prices due to strong competition (small operator) and lack of devoted lanes and unloading bays (large operator). According to the Municipality representative, there are some organizational issues in the urban freight distribution; furthermore, the legislation on (city) logistics seems too liberal.

Evaluation of solution proposed

In this section, the interviewees had to declare their evaluation of different aspects of the proposed solution, expressing an opinion that could range from *extremely disagree* to *extremely agree*. Specifically, the individual acceptability, the technical feasibility, the financial viability, the power to generate environmental benefits and the social desirability were

investigated; besides, respondents were asked if the solution can *improve logistics efficiency* and if it can be *acceptable to shippers and receivers*.

Following Table 18 *consensus* concerning the solution proposed is not so widespread. In particular, while the Municipality at least “agree” with all the 7 different options, the small operator showed some doubts as regards to the economic aspects i.e. financial viability and logistics efficiency improvement. The big company (DB Schenker Norway) is the most sceptical, appreciating the solution only in terms of its technical feasibility and social desirability.

Table 18. Evaluation of solution proposed - Oslo

	Strongly disagree	Disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Agree	Strongly agree
Individually acceptable			✓		✓	✓	
Technically feasible					✓	✓	✓
Financially viable		✓	✓			✓	
Environmentally beneficial				✓	✓		✓
Socially desirable						✓	✓✓
Improve logistics efficiency	✓		✓			✓	
Be acceptable to shippers and receivers		✓		✓		✓	

✓ - big operator; ✓ - small operator; ✓ - Municipality.

Stated behavioural reactions to the proposed solution

Questions of this section were posed only to the big company and city representatives. The large operator estimated that the new system will deliver about 1500 (20-30% of the total) parcels from the central Oslo depot to receivers. Both the big company and the city representatives think that customers should pay more for having the solution implemented. On the contrary, they have different views on a possible trade-off between logistics cost reduction and environmental benefits. In particular, interviewees were asked: 1) if they would continue to operate/support the system if it met traffic reduction and environmental improvements while increasing total logistics costs (second question); 2) if they would continue to operate/support the system if it enhances total logistics costs reduction, while not achieving traffic reduction and environmental improvements (last question). In this last case, the public official answered that the city of Oslo would not provide any support, while the private representative confirmed that his company would keep performing the service. As regards the second question, they change places with each other. The opposite public and private perspective confirms the importance and need of both self-financial sustainability and efficiency of the business model.

Upscaling and transferability perceptions

The small company was not involved in this section. The other two organizations, the big company and the municipality agree on the possibility to extend this delivery system to other cities (e.g. Bergen) as well as to other delivery companies. Concerning the possible extension to other parts of the freight and logistics industry in addition to parcels, only the Municipality seems to be optimistic. Moreover, the big operator also ruled out the possibility to increase the volume of parcels going through by this new system, since it would reduce its market share.

Suggestions

Both logistics operators agreed upon the fact that the solution proposed could be less effective for two main reasons: 1) the goods terminals of the main logistics companies are not located that far from the city centre (i.e. a new depot is not a priority); 2) many delivery vehicles of the big players are already expected to be zero emission in the future. Therefore, they instead hope for a fine-tuned city logistics legislation and dedicated parking places where it is possible to recharge the electric vehicles. On this subject, the city representative seems to be very helpful, even if he relates to “Construction and purchasing” which should be made by municipal agencies.

In more technical detail, the big operator highlights two side effects: on one side, vehicle mileage could unexpectedly increase due to the new need of dividing deliveries by size and weight of goods; on the other side, the risk of damaging the goods also increases with the number of transshipment points and handling of goods during transportation.

Awareness and importance of the issue

The respondents’ willingness to take part in a Living Lab to co-create an effective and financially sustainable solution, explored in the last part of the questionnaire, appears to be very strong. In this section, the first question was to provide three main motivations for participating in the consolidated joint delivery scheme. Apart from the small company, which was looking for the “financial viability”, the large operator would participate to improve operational efficiency by reducing costs and increase customer satisfaction, while the Municipality appreciated the traffic reduction and the analytical usefulness of the business model. Lastly, both the large company and the municipality agreed upon the distribution of responsibility and an increased level of involvement by purchasing and public institutions. The results of the second question of this section are presented below.

Table 19. Awareness and importance of the issue - Oslo

Issues/Concerns	Extremely irrelevant	Irrelevant	Somewhat irrelevant	Neither irrelevant nor relevant	Somewhat relevant	Relevant	Extremely relevant
1. Initiatives to reduce traffic impacts						✓✓	✓
2. Initiatives to reduce environmental impacts (specifically zero emission last mile)						✓✓	✓
3.3. Initiatives to improve business efficiency and reduce total logistics costs						✓✓	✓

✓ - big operator; ✓ - small operator; ✓ - Municipality.

Specifically, respondents had to state how important is to participate in: *initiatives to reduce traffic impacts; initiatives to reduce environmental impacts; initiatives to improve business efficiency and reduce total logistic costs*, with the possibility to express an opinion choosing among 7 degrees of agreement. Private interviewees expressed "relevant" for all the topics; the Municipality representative considered them “extremely relevant”.

Transferability: Oslo vs London

In both cities it was possible to interview 1 institutional representative belonging to the Municipality and 2 private logistics operators, one from a small and the other from a large enterprise. The present situation in Oslo can be hardly described due to the lack of information about the number of parcels going currently through the central depot, the kilometres travelled and the fuel consumption. The typical vehicle used by both cities is diesel fuelled, Euro V or VI. More specific data can’t be compared since answers were not provided by all the logistics

operators, even if the value of fuel consumed (around 600 litres) in London is somewhat similar to the one in Oslo.

As regards the efficiency and organization level of the current system, it is much more appreciated in Oslo than in London, where no respondent is satisfied with it. In both cities the main critical points concern efficiency, in terms of congestion costs, and sustainability. The initiative, thus, proposes to split the delivery process in two steps: 1) the big operator delivers its parcels to the central depot where 2) the small operator picks them up for the final delivery to customers using electric vehicles.

When asked about the described solution, respondents in the two cities showed a very different attitude. In London a widespread *consensus* concerning the solution proposed is showed, with a minimum doubt about the *financial viability* (expressed by TFL). In Oslo, only the Municipality sees the initiative as a good solution to its dissatisfaction with the present situation. The logistics operators, on the contrary, which were neutral on that point, are more doubtful about the economic aspects (i.e. financial viability and logistics efficiency improvement). Social and environmental benefits are expected, while the technical feasibility is not into question at all.

Moreover, while 2500 parcels per day are planned to be transferred to Gnewt's depot in central London, with a full electric Nissan Env200, the large operator estimated that the new system in Oslo will deliver about 1500 (20-30% of the total) parcels from the central depot to receivers. A 75% reduction in total amount of kilometres driven is thus expected in London (around 1400 km per week) and a 100% reduction in fuel consumption due to the fully electric vehicles use.

The two cities showed a similar approach when facing the possible trade-off between efficiency (logistics cost reduction) and sustainability (environmental benefits). Only the Municipalities would still be willing to support the initiative even if it met the environmental objectives, without being convenient from a logistics cost perspective; while logistics operators, as expected, would not be. Conversely, if the system met total logistics costs reduction objectives while not achieving traffic reduction and environmental improvements, it would still be supported only by the private respondents in London and Oslo, while the public officials would draw back. The opposite public and private *view* confirms not only the importance and need of both self-financial sustainability and efficiency of the business model, but also the public interest on the environmental concern.

Finally, as regards the willingness to pay for the project, all respondents from the two cities agreed about the fact that end customers should pay for having the solution implemented; in London the private operators also indicated TFL for subsidizing the initiative.

Moreover, the big operator in Oslo also ruled out the possibility to increase the volume of parcels handled by this new system, since it would reduce its market share; on the contrary, in London both transport companies were in favour of increasing the volume of parcels going through this new system, with estimates of 50% for TNT; 200% for Gnewt Cargo.

Lastly, the private operators interviewed in the two cities agree on the possibility to extend this delivery system not only to other cities but also to other delivery companies, but in Oslo they are more doubtful about the possibility to extend it also to other parts of the freight and logistics industry in addition to parcels. Only the Municipality of Oslo, likewise its counterpart in London, seems to be optimistic on this point.

The different private and public approach is also reflected in the suggestions provided in the two Living Labs; nevertheless, the suggestions from London operators are more proactive and practical (support and cooperation, especially for finding out location availability), while the Norwegian respondents highlight the fact that, since Oslo is much smaller than London, the solution proposed could be less effective, not only because the main logistics companies in Oslo are closer to the city centre, but also because the big players would rather have proper infrastructure to facilitate zero emission vehicles than to use an additional transshipment facility closer to the city centre.

Despite these sceptical comments, especially provided by the large logistics operator, in both Oslo and London, respondents' willingness to take part in a Living Lab appears strong. Following their interest in co-creating an effective and financially sustainable solution for delivery schemes, they all try to improve operational efficiency as well as to test a new business model, especially as it concerns cooperation among private and public partners.

Accordingly, all the respondents attach (at least) a great relevance to participating in initiatives for reducing traffic, environmental impact and logistic costs as well as for improving business efficiency. In this case, the fact that the respondents are more (London) or less (Oslo) already involved in the solution implementation doesn't seem to play any role; on the contrary, the view of the "not involved" operator could provide interesting prompts.

In conclusion, the solution implemented in London seems, from a behavioural point of view, very difficult to be transferred to Oslo.

5.5 Paris replicating Brussels: Increasing vehicle loading by utilising spare capacity

The proposed solution in Brussels living lab aims to replace inefficient store owner collections and increase vehicle load factors of service providers by introducing a new online sales channel and using spare van capacity from existing service providers to reach these stores.

The replicating idea is that a multinational company offers the possibility to order products online and have them delivered to stores at a competitive price so to decrease the number of trips currently made to the wholesaler or to the retailer.

The survey investigates the possibility to transfer in Paris this innovative solution from a behavioural point of view; to this aim, five store owners in different³³ *arrondissements* of the city have been interviewed.

Characterisation of present behaviour

This section describes the current situation *via* three main questions concerning habits in terms of deliveries and relationship between shop owners and transport providers. Most of the respondents (4 out of 5) get all the merchandise through pick-ups at a wholesaler, while the last one, that has been franchised a few years ago, get the 70% of the goods delivered by a distributor, going to a wholesaler for the 30% left over.

Consequently, the second question, concerning the relationship between the shop and the distributor, was asked only to this (very central) shop owner, who receives the goods, transported by HGVs 3 times/week at 8:00 in the morning; despite a short time for unloading and delivering, the store owner considers the transport of these goods as a cost.

As regards the pick-ups, they mostly go to Metro (all of them), or to Rungis for fresh goods (60% of the respondents) or a smaller one, Omran (20%). They go to the wholesalers using their own vehicles 1 or 2 times per week, usually on Monday morning, spending 2 or 3 hours per time; although they do not have always to close their shops (only 2 of them have to), they consider these purchasing trips as a cost.

Perceptions of present situation

In this section, respondents were asked to express their opinion on the convenience of the current situation. The clear majority answered they at least “*somewhat agree*” with the statement; only one was a little bit disappointed (*somewhat disagree*).

Table 20. Perceptions of present situation - Paris

	Strongly disagree	Disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Agree	Strongly agree
“the current way of working is convenient”			✓		✓✓✓		✓

✓ shows the selected option by each respondent.

Despite this result, showing that the *status quo* is mostly perceived good and convenient, store owners complain about time losses, also due to congestion and parking troubles, traffic calming strategies (closing lanes) and regulation policy (parking price).

Evaluation of solution proposed

³³ They are located in the very centre of the city (IV), in the semi-central eastern zone (X and XI) and in the outskirts (XVII and XX).

Interviewees were then asked to state their level of agreement (from *extremely disagree* to *extremely agree*) with five statements regarding the proposed solution, through which they would be offered by a big Multinational the possibility to order products online so to decrease the number of their purchasing trips to the wholesaler.

Table 21 summarizes this section results.

Table 21. Evaluation of solution proposed - Paris

	Strongly disagree	Disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Agree	Strongly agree
Individually acceptable	✓✓	✓			✓✓		
Technically feasible	✓✓			✓	✓✓		
Financially viable*	✓✓			✓✓			
Environmentally beneficial	✓✓			✓	✓✓		
Socially desirable	✓✓			✓	✓✓		

✓ shows the selected option by each respondent.

* One answer “depend” has not been included.

The first main result is that no respondent ever matched the convinced “*consensus*” boxes, neither the “strongly agree”, nor the “agree” one, for any of the five statements; moreover, the choice of the “strongly disagree” option suggests a strong opposition to the initiative.

Stated behavioural reaction to the proposed solution

This section of the questionnaire investigates the interviewees’ willingness to pay for the proposed solution and their stated behavioural reactions.

Answers to the first question show that 4 out of 5 respondents were willing to order online some of their merchandise, purchase cost remaining the same; nonetheless, only 2 of them would be willing to pay a certain amount for the delivery, while one thinks that the seller should pay for the delivery.

Lastly, asked about their willingness to tell other people about the solution, only one positively replied.

Upscaling and transferability of the solution

This section aimed at investigating expectations and perceptions about the transferability of the solution in other contexts. Specifically, the first question asked if respondents would be more willing to order online if multiple consumer goods manufacturer co-operate, offering a joint service, while the second one asked if respondents would be more willing to order online if all fast-moving consumer goods were offered through this type of platform (including fresh food and frozen food). In both cases they all answered yes or at least *maybe*.

Suggestions

In this very last section, most of the shop owners confirmed what was already clear along carrying out the whole survey, i.e. their concern about increased delivery costs; indeed, they recommend very low prices in order to make this initiative attractive.

Awareness and importance of the issue

As regards the three main motivations for participating in the proposed alternative delivering system, apart from the free service or at least fair prices required, store owner seemed attracted by the possibility to improve effectiveness (e.g. solving parking problems) and organization of the deliveries.

The second question asked respondents to assess the importance of participating in the project in order to contribute to: *decreasing costs*; making the *deliveries more convenient*; achieving/improving *sustainability*. 7 levels of importance are available: from *Extremely irrelevant*, to *Extremely relevant*. Results are presented in the Table 22.

Table 22. Awareness and importance of the issue – Paris

Issues/Concerns	Extremely irrelevant	Irrelevant	Somewhat irrelevant	Neither irrelevant nor relevant	Somewhat relevant	Relevant	Extremely relevant
<i>Decreasing costs</i>	✓		✓	✓✓	✓		
<i>More convenient deliveries</i>				✓	✓✓✓✓		
<i>Sustainability</i>				✓✓✓	✓	✓	

✓ shows the selected option by each respondent.

Nobody ever matched the box “*Extremely relevant*”, while the “neutral” (*Neither irrelevant nor relevant*) and “somewhat relevant” options were matched in most cases, thus demonstrating only a vague interest in the theme and little confidence in the project, especially in terms of its power to decrease costs.

A certain importance is attached to the possibility of having more convenient deliveries, while the sustainability aspects seem a relevant aim for at least one respondent.

Transferability: Paris vs Brussels

In order to analyse the replicability of such a solution, the *status quo* in Brussels and Paris is described. Actually, Brussels has about 900 independent small grocery stores, which, on average, replenish stock twice per week, mostly going to a wholesaler. Nowadays, after many closures between 2011 and 2014, Paris present 864 small grocery stores³⁴ which have often been taking over by retail chains in the last 10 years, thus changing a lot the delivery system for supplies. Most of the former independent store owners, which came from North Africa, are now planning their retirement. Additionally, 63% of deliveries to independent grocery stores and retail chain-based convenience stores in the Paris region are made by the suppliers (43%) or by a logistics provider (20%); the left 37% is done by own vehicles of the store owners³⁵.

In Brussels most of the respondents (62%), get merchandise combining deliveries by a distributor with pick-ups at many different wholesalers often chosen based on price competitiveness while in Paris they mostly go to the same big wholesalers (more than 80%). Even though they do not have to close their shop during their visits/pick-ups to the wholesaler, Belgian respondents do not consider these purchasing trips as a cost while store owners in Paris do.

In both cities the majority of respondents answered they at least “somewhat agree” about the convenience of the current situation, showing a high level of acceptance of the present conditions.

³⁴ Source: APUR, 2015, page 14.

³⁵ Source: Paris region urban freight survey, LAET, 2012

Asked about the proposed solution, the opposition to the initiative is much stronger in Paris, where, differently from Brussels, some respondents strongly disagree while no one agrees; the respondents' scepticism is higher about the financial aspects. In both cities, the frequency of "Neither/nor" answers could witness a sort of uncertainty feeling about the outcome of the solution and its impact and convenience. Lastly, in Brussels only, the environmental benefits turned out to be a little bit more relevant than the other aspects.

Despite the scarce *consensus*, in Paris not only the willingness to adopt the solution seems much higher (around 80% compared to 53%) even with certain conditions on the prices, but also 40% is willing to pay for this solution, while in Brussels none was.

Both cities seem attracted by a hypothetical cooperation among manufacturers; actually, they will be more willing to order online if multiple consumer goods manufacturer co-operate.

According to respondents' suggestions and motivations for participating in the proposed alternative delivering system, a possible price increase can be the main deterrent, while efficiency seems the most attractive aspect, due to the diffused feeling of overconsumption of deliveries. Despite its scepticism, surprisingly, Paris seems more concerned than Brussels about the proposed topics; specifically, in both cities there is a certain indifference, especially in Brussels, which considers even irrelevant the aim of decreasing costs. Nevertheless, the sensation is that the general opposition towards any "change" – even favourable (decreasing costs and making deliveries more efficient) – in Paris could be the consequence of a certain fear of the local administration decisions; store owners seem disappointed with the implementation of future urban sustainable mobility policies, such as: the new Low Emission Zone, the end of Diesel vehicles by 2024 (often the most used by the small store owners), new strict parking rules (illegal parking is a common practice among store owners), and so on.

All things considered, despite a similar evaluation by respondents, but probably due to the different starting points, i.e. the most of the Parisian shops already receive the goods at their own place while the opposite occurs in Brussels, and the trends in the city ("new" independent and specialised grocery store owners – which already order online – increasing, while the "old"/traditional independent grocery store owners disappearing, being replaced by retail chain with organised supply chains), the CITYLAB proposal for Brussels does not seem to be "the solution", thus reducing its transferability impact in Paris, unless some adjustments are made.

5.6 Rome replicating Amsterdam: Floating depot and clean vehicles

The proposed solution in Amsterdam Living Lab aims at replacing the current system of pick-up and deliveries made by vans, by involving supply-side stakeholders and using city freight bikes for handling post items and parcels *via* micro-hubs in the centre.

The replicating idea is that the national postal operator will pick-up and deliver its post items and parcels with freight bikes via micro-hubs in central Rome (instead of them being picked-up and delivered in central Rome by van at present).

The survey investigates the possibility to transfer in Rome this innovative solution from a behavioural point of view; to this aim a questionnaire was submitted to three main stakeholders: a representative of Poste Italiane, one of a shipper (a Poste Italiane customer) and one of the Municipality.

Characterisation of present behaviour

This section, whose aim was to investigate Poste Italiane behaviour before the implementation, was only relevant for its representative. Therefore, only one stakeholder provided answers, which describes the current situation as follows: 8.000/10.000 parcels currently go through Rome every day, on a Panda-FIAT type (weight of 900/1000kg), classified Euro 5/6 using Diesel as fuel source. Around 16.000 km are travelled using 200 litres of fuel every week.

Perceptions of present situation

This section included questions related to the perception of present situation among the three stakeholders interviewed. Table 23 shows the answers matched by the stakeholders for the first question, according to which, the service is perceived as quite efficient.

Table 23. Perceptions of present situation - Rome

	Strongly disagree	Disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Agree	Strongly agree
Current system is well organised and efficient					✓✓	✓	

✓ - shipper; ✓ - Poste Italiane; ✓ - Municipality.

Asked to provide some critical aspects concerning the main business and operational aspects of the current system, respondents underlined some problems concerning the delivery time agreed, the vehicles typology and the employment contracts.

Evaluation of solution proposed

The next question investigated specific aspects of the solution, such as acceptability and feasibility degrees. Results are illustrated in Table 24, which shows which answers were matched the most.

It is worth noticing that only 14% of the answers witness a certain indifference, being the 66% of the answers placed between *agree* and *strongly agree*: the overall perception of the initiative is certainly positive.

Table 24. Evaluation of the proposed solution - Rome

	Strongly disagree	Disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Agree	Strongly agree
Individually acceptable				✓		✓✓	

Technically feasible				✓		✓✓	
Financially viable				✓	✓	✓	
Environmentally beneficial						✓	✓✓
Socially desirable					✓	✓✓	
Improve logistics efficiency					✓	✓✓	
Be acceptable to shippers and receivers					✓	✓✓	

✓ - shipper; ✓ - Poste Italiane; ✓ - Municipality.

Stated behavioural reaction to the proposed solution

In this section some questions were asked only to the logistics operator which is willing to adopt the new solution with a 5/10% parcels managed, and 5% distance travelled (km); no estimates were instead provided on the fuel (consumption and) savings.

According to the shipper, none else should pay for having the solution implemented, while Poste Italiane identifies the Municipality as the possible subject for paying, which, actually, agrees on this, even if it considers difficult to estimate the appropriate amount of subsidies for such a solution.

When asked if they would continue to operate and “support the new system in case it meets its traffic reduction and environmental objectives, but is found to increase total logistics costs”, only the public representative is willing to, following its mission to improve general sustainability in the city, while Poste Italiane matched no, for reasons related to business model sustainability and related risks. Anyway, none of the 3 stakeholders would continue to support the new system in case the only benefit resulted in a cost reduction with no improvement of traffic and environmental sustainability.

Upscaling and transferability perceptions

Asked if they could further increase the volume of parcels handled by this new system, no respondent positively answered. On the contrary, all of them have optimistic perceptions about the possibility to extend this delivery system to other cities and other delivery companies, as well as to other parts of the freight and logistics industry (logistics operators) in addition to parcels, except for Poste Italiane, which remains sceptical about this last point.

Suggestions

Following the last section of the questionnaire, the main suggestions provided deal with the possibility to improve the cycling lanes system, to apply this solution also in very congested cities and to other goods categories.

Awareness and importance of the issue

In this section two questions aimed to provide: (i) main motivations for participating in such an implementation and (ii) how it is important to participate to initiatives with respect to specific aspects (i.e. reducing congestion, improving environment, involving the citizenship). As the shipper did not answer to question 1, the answers were only provided by the Poste Italiane representative, who is attracted by innovative and sustainable solutions in order to decrease transport costs, and by the Municipality representative, which focuses on reducing freight vehicles impact in specific neighbourhoods, on improving last mile deliveries efficiency and on involving all stakeholders in similar decisions.

As regards the second question, Table 25 presents options matched by respondents when investigating their perceived relevance of the issue. According to the results below, the solution proposed seems mostly to deal with relevant issues.

Table 25. Awareness and importance of the issue - Rome

Issues/Concerns	Extremely irrelevant	Irrelevant	Somewhat irrelevant	Neither irrelevant nor relevant	Somewhat relevant	Relevant	Extremely relevant
1. Initiatives to reduce traffic impacts						✓✓	✓
2. Initiatives to reduce environmental impacts (specifically zero emission last mile)						✓✓	✓
3 ³⁶ .Initiatives involving people in identifying freight mobility solutions				✓		✓✓	

✓ - shipper; ✓ - Poste Italiane; ✓ - Municipality.

Transferability: Rome vs Amsterdam

First of all, it should be said that, being Rome around 6 times the size of Amsterdam (in terms of km) there could be some initial doubts casted on the replicability of Amsterdam solution in Rome. Nonetheless, the two cities, investigated throughout questions to the same typology of interviewee, provided very similar results.

For example, both cities are quite satisfied with the present situation, even if they complain about the deliveries lack of punctuality; surprisingly, no mention about parking and congestion have been made by Italian respondents.

Despite this satisfaction with the current system, the two cities showed to appreciate the benefits expected from the project. In more detail, Rome “extremely” agrees only on environmental benefits, while Amsterdam seem to be more convinced also about other aspects; nonetheless, in Amsterdam more neutral or vague responses have been provided than in Rome.

The results concerning the willingness to adopt the solution are perfectly consistent with each other, even if only the National Dutch Postal operator thinks it will expand its activity rate in terms of parcels handled using the bike freight system.

Lastly, both Amsterdam and Rome agreed on the bike usage and cycle-lanes planning, sharing also the interest for efficiency, especially in terms of cost reduction.

In conclusion, if Rome seems to be just a little bit more committed than Amsterdam, it is probably also due to the two different starting points with respect to congestion and pollution, so to make respondents in Rome trusting a freight bike system even in a city that presents a very poor level of urban infrastructures for cycling³⁷. Within this context, Rome appears, from a behavioural perspective, as a very good candidate for implementing the Amsterdam solution.

³⁶ It is worthwhile noticing that the third question has been changed with respect to the original questionnaire for Amsterdam, since it dealt with canals usage.

³⁷ According to the last report from Legambiente titled Ecosistema Urbano (Legambiente, 2016), Rome is 77th among the major 110 Italian cities, w.r.t. a ciclability index (equivalent m/100 inhab).

5.7 Southampton replicating Oslo: Common logistics functions for shopping centres

The solution proposed in Oslo consists in introducing common logistics functions for freight flows (both inbound and outbound) inside shopping centres (SCs), in order to reduce time spent by freight vehicles at their shopping centres.

The replicating idea is that a common logistic function is provided at the West Quay³⁸ shopping centre in Southampton. The solution will also offer collection and transport of waste from the shops, reverse logistics and use of buffer storage for shorter storage of shipments. Consolidation options for logistic service providers as well as opportunities for out-of-hours deliveries will be identified, resulting from the decoupling of external and in-house transport legs of the supply chain to the shopping centre.

The survey investigates the possibility to transfer in Southampton this innovative solution from a behavioural point of view; to this aim, six representatives of shops belonging to a retail chain located in the shopping centre have been interviewed.

Characterisation of present behaviour

First of all, some characteristics of the shops whose representatives have been interviewed, can be provided. They have been located in the shopping centre on average for more than 13 years (min 8, max 17), and give work to 12 employees (min 7, max 26), mostly part time workers. Since few information has been collected directly among the retailers about the dimensions of the sales area³⁹, some estimates are provided using the map of the SC. None of the shops has the storage room inside the shop. Only one of them has its shipments delivered at the unloading ramp; all the remaining receive their goods directly at the shop. 67% of shops (4) receive 2 shipments per week: one on Tuesday, one on Thursday (3 shops out of 4) or Friday; the two other shops receive 3 and 5 shipments respectively: the latter has daily deliveries. No shipment is delivered on Saturday. Most of the shipments are not delivered at regular times; the few regular ones (25% of the total) arrive between 7 and 10 in the morning. Furthermore, 67% of the interviewees stated that the information about goods is delivered in advance *often* or *all the time* (Figure 20).

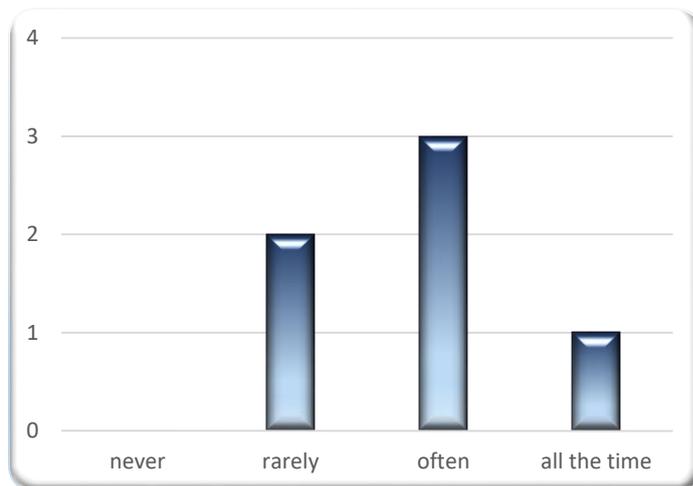


Figure 20. Frequency of information about goods delivered in advance - Southampton

³⁸ West Quay is the largest shopping centre in Southampton, with a sales area of about 70.000 sqm.

³⁹ 5 out of 6 respondents answered they *don't know*.

At present 33% of retailers do not have a fixed delivery time while all those having a fixed delivery time state that shipments are *often* or *all the time* delivered at the time agreed (Figure 21).

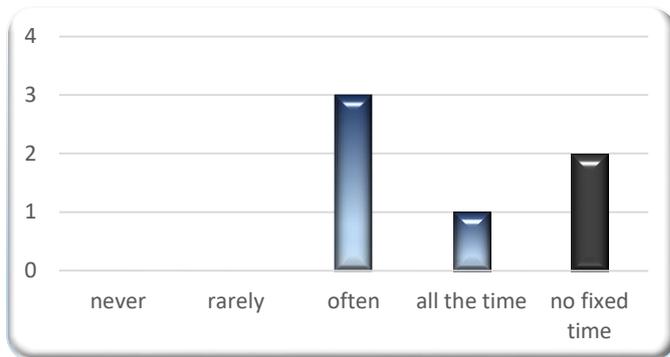


Figure 21. Frequency of shipments delivered at the time agreed - Southampton

Asked about the average time spent in the shop when receiving shipments, most of the respondents could not provide an estimate due to the high variance (min: 5 minutes – max: several hours) related to different shipments.

Finally, the current situation is also characterised by the absence of an integrated system of direct and reverse logistics: since logistic service providers do not take waste out of the shop after delivering the goods, all the shops are obliged to organise the transport of waste themselves.

Perceptions of the present situation

Nonetheless, retailers mostly agreed that the present goods deliveries and waste collection service is well organised; specifically, 83% of them at least *agrees* on the good organization of present system, while only 7% *disagrees*.

Table 26. Perceptions of present situation - Southampton

	Strongly disagree	Disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Agree	Strongly agree
Current system is well organised and efficient		✓				✓✓✓	✓✓

✓ shows the selected option by each respondent.

In line with this last result, most of the retailers did not indicate any critical aspect for the present system; only two of them complained about time losses due to busy loading bays or difficulties in finding the shop inside the shopping centre.

Evaluation of solution proposed

As regards this section, only 4 out of 6 representatives answered, the others stating that the head office should answer. In particular, the retailers expressed their opinions about the proposed solution from *extremely disagree* to *extremely agree* in terms of its “individual acceptability”, “technical feasibility”, “financial viability”, “social desirability” and the perception of it as “environmentally beneficial”.

Only one of them agrees with all the statements while the other 3 disagrees or extremely disagree with it, showing a widespread scepticism towards the initiative effectiveness.

Table 27. Evaluation of the proposed solution - Southampton

	Strongly disagree	Disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Agree	Strongly agree
Individually acceptable	✓	✓✓				✓	
Technically feasible	✓	✓✓				✓	
Financially viable	✓	✓✓				✓	
Environmentally beneficial	✓	✓✓				✓	
Socially desirable	✓	✓✓				✓	
Improve logistics efficiency	✓	✓✓				✓	
Be acceptable to shippers and receivers	✓	✓✓				✓	

✓ shows the selected option by each respondent.

Stated behavioural reaction to the proposed solution

Unfortunately, the behavioural reactions to the proposed solution in terms of willingness to pay could not be investigated, as most of the interviewees declared not to be able to answer: head office should, instead. Another one dealing with jewels would not consider the idea, while only one retailer answered that he would not pay, neither would he make others paying for the solution to be implemented.

Upscaling and transferability perceptions

Retailers were asked about the possibility to: extend both the system to other shopping centres and the number of services offered; in this latter case, they were supposed to specify which services.

Only half of the sample has answered the two questions: they were all convinced that other shopping centres could benefit from this solution; instead, out of them (3), only one was sceptical about the possibility to extend the number of services offered, the other two indicating waste collection and on-site maintenance as possible additional services.

Suggestions

No suggestions were provided in the last part of the survey, except for the recommendation to take into account the security of the shipments.

Awareness and importance of the issue

The first question posed was: *What are the three main motivations for introducing Common logistic functions for shopping centres in Southampton initiative?* Retailers could reply by using three open answers. Three respondents provided a single motivation each, related to the busy loading bay problem solving (2) an environmental concern (1). One respondent suggests that the head office should answer. Interviewees were also asked to express their opinions about the perceived importance⁴⁰ attributed to participating in common logistic functions according to three main topics: (i) buffer storage services (temporary storage); (ii) the possibility to affect time of delivery to the shop; (iii) better handling of returns, packaging materials and waste.

⁴⁰ Likert scale is articulated in 7 levels, namely: *extremely irrelevant, irrelevant, somewhat irrelevant, neither, somewhat relevant, relevant, extremely relevant.*

Only one retailer replied, considering *somewhat relevant* the possibility to affect time of delivery to the shop; he was quite neutral about the other two topics, which he considered neither relevant nor irrelevant.

Transferability: Southampton vs Oslo

In order to test the replicability of the solution, an overview of the two cities results comparison is provided here. The first main output is a great heterogeneity in terms of size (area and employment) and age of presence in the shopping centre in both cities. On the contrary, in Oslo most of the interviewees had a storage room inside the shop, different from Southampton, where none had; nevertheless, they all have their shipments delivered directly to the shop.

On average, frequency of shipment seems higher in Oslo, where deliveries occur during regularly scheduled time-windows, and preferably in the morning; in Southampton, instead, if most of the shipments are not delivered at regular times, they left arrive in the early morning. The two cities present similar results not only in terms of information about goods, which is mostly delivered in advance *often* or *all the time*, in Southampton and Oslo, respectively, but also of shipments that are *often* or *all the time* delivered at the time agreed. Lastly, both state that it is very difficult to provide estimates on average time spent in the shop when receiving shipments.

Both the cities' respondents are quite satisfied with the present good deliveries and waste collection service is well organised; as a consequence, the few comments provided on critical points are more suggestions than complaints. Furthermore, the results of the evaluation of the solution proposed show a widespread scepticism towards the initiative effectiveness, in both cities, especially in UK. In more detail, as regards Oslo, the only aspects which respondents seem to appreciate are the technical feasibility, the financial viability and the possibility to benefit the environment.

Following this widespread scepticism, nobody is willing to pay for the proposed solution in Southampton, and only few are in Oslo, even not specifying "how much".

There is a widespread agreement on the possibility to extend the system to other shopping centres, but not to extend the number of services offered.

In both cities, the environmental concern seems to be the main motivation for introducing common logistic functions for shopping centres, especially in terms of the possible introduction of an integrated system of direct and reverse logistics; furthermore, in Oslo, the possibility to affect time of delivery to the shop, a better handling of returns, packaging materials and waste and temporary storage availability are considered even less and less relevant, in this specific order.

As a general consideration, since the main learning of the Oslo survey was to better comprehend retailers' needs, in Southampton a wider sample might help improve the logistics strategy in a shopping centre.

To sum up, the solution implemented in Oslo seems to have, from a behavioural perspective, a good potential to be transferred to Southampton.

6 Transferability outside CITYLAB Living Labs

To explore the transferability of the CITYLAB solutions to other contexts, it is possible to compare the results of the *ex-ante* questionnaires about the same proposed solution in non-CITYLAB cities.

The replicating cities have been chosen within the same country of the original implementations, thus sharing at least an institutional proximity (Boschma, 2005). In particular, the interested cities were directly involved by some Living Labs for testing if and how their own solution can be adopted. Accordingly, the same *ex-ante* questionnaires have been administered and the survey results compared between the two different cities.

This chapter focuses on the two solutions of Brussels and Rome proposed in Antwerp and Milan, respectively. In the following, the two analyses are described, following the original questionnaire structure. Furthermore, the comparison with the results already presented in CITYLAB (2018a) is presented at the end of each section.

6.1 Antwerp replicating Brussels: Increasing vehicle loading by utilising spare capacity

Due to the low willingness to participate in Brussels⁴¹, some independent store visits took place randomly in different areas of Antwerp, the second biggest city of Belgium, in order to check if this would yield different results.

The solution goal is twofold: to replace inefficient store owner collection process, on one side, and to increase the vehicle load factors of the service providers, on the other. To this aim, Procter and Gamble, a manufacturer of fast-moving consumer goods would introduce a new online sales channel using spare van capacity from existing service providers to make products delivered to the stores at a competitive price. The aim is also to decrease the number of trips currently made to the wholesaler or to the retailer by the store owners.

A) Type of interviewee

The behavioural analysis is performed by submitting questionnaires to 27 independent store owners randomly chosen in different areas of the city.

B) Awareness and importance of the issue

This section of the questionnaire administered in Antwerp is structured as follows: in the first question, respondents are asked to provide motivations for their participating in the project; in the second one, they have to state the level of importance they attach to the effectiveness of the solution, according to several different aspects.

As regards the three main motivations for participating in the solution and having the products delivered in an alternative way, 11% of the sample did not reply and 30% provided motivations for their lack of interest in the initiative: specifically, they mostly complained about the limited product assortment offered (50%) and the language barrier (25%); they also showed some mistrust of technological means (37%), preferring the current delivery system. The whole sample (59%) of interested respondents identified convenience as their motivation for participation in the solution; among them, 50% were also attracted by the easiness of the system, while the poor supply is again considered as a critical issue (18%).

The second question asked respondents to assess the importance of participating in the project in order to contribute to: *decreasing costs*; making the *deliveries more convenient*; achieving/improving *sustainability*. 7 levels of importance are available: from *Extremely irrelevant*, to *Extremely relevant*.

Results concerning those who replied to this question (74% of the sample) are presented in Figure 22, according to which, only one store owner always matched the box “*Extremely irrelevant*”, due to the fact that the store is closing soon.

As regards the possibility to have costs decreased, most of the respondents consider the contribution of the solution as relevant (35%) or extremely relevant (55%).

Fewer store owners think that the solution will contribute to more convenient deliveries: 40% thinks it could be relevant or somewhat relevant; 45% is indifferent.

Lastly, 65% of the respondents considers the solution at least somewhat relevant in granting sustainability, while 25% has not an opinion on the issue.

⁴¹ See CITYLAB (2018a).

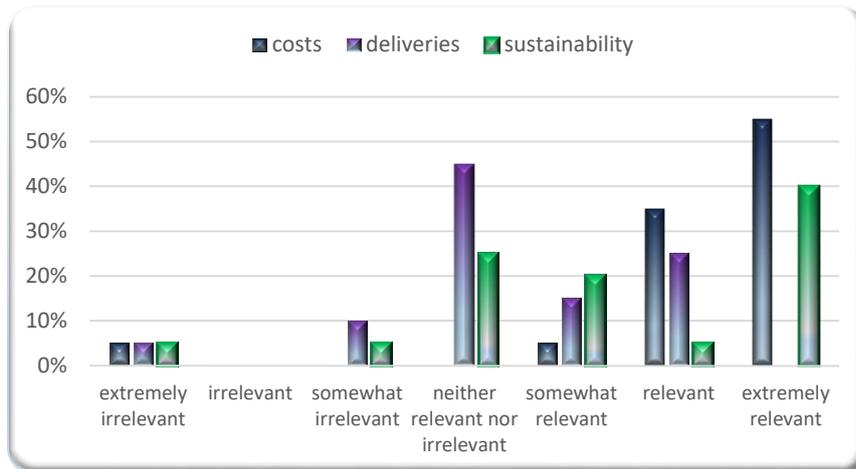


Figure 22. Awareness and importance of the issue – Antwerp

C) Characterisation of present behaviour

This section describes the present situation *via* three main questions concerning habits in terms of deliveries and relationship between shop owners and transport providers. First of all, respondents (85% of the total sample)⁴² were classified according to their stock replenishing process: as illustrated in Figure 23, only 1 retailer already gets merchandise delivered by the distributor.

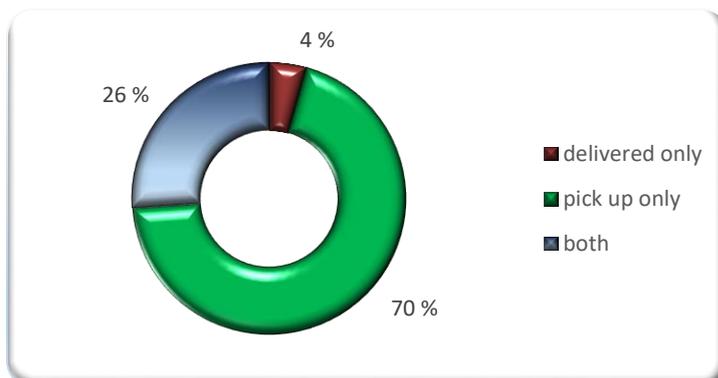


Figure 23. Habits of stock replenishment - Antwerp

Taking into account this sub-sample, most of the retailers go to the wholesaler and pick up the merchandise; specifically, for 70% of them, this is the only way of acting; another 26% has its shipments also delivered directly to the shop. Following these results, only 30% of the sample was supposed to answer to the second question concerning the relationship with the distributor. The few information collected identifies 4 different distributors; store owners indicated only one (2/3) or 2 (1/3) of them. Furthermore, there is a high heterogeneity in the frequency of delivery: from daily shipments up to 1 delivery per week. No other information was provided.

On the contrary, the pick-up process to the wholesaler could be better described. Among the 96% going to the wholesaler, 32% did not answer about the number of the wholesalers while the others mostly use Colruyt as their unique supplier; only one retailer picks up the products

⁴² 3 of them did not give any answer, 1 did indicate “other” without specifying, due to its particular situation (closing soon).

at two different wholesalers (Action and Okay). As it is for the frequency of their trips for replenishing the stock, 15% goes just one time per week, 76% 2 or 3 times per week, 8% whenever “it is necessary”. Asked about volumes in m³, half of those providing an answer (only 4 out of 22 in this category) answered they come back with their car full; other 2 retailers answered about the value of the provision: on average it is 525€. Trip-time took on average 2h/2h30'. As regards the time window for the pick-up, the sample equally split up into those who go to the wholesaler in the morning or in the afternoon or after 7pm. Store owners do not usually have to close their shops during their trip for going to the wholesaler; only 1 store owner has to do it. The vehicles used for pick-up are: BMW3 Diesel Euro IV or Mercedes Vito or Volkswagen Golf.

Asked if they consider the trip to the wholesaler as a cost, 71% answered they do not, while for 29% it is a cost; nonetheless, none states the amount of this cost.

D) Perceptions of present situation

In the fourth section of the questionnaire, regarding perceptions of the present situation, respondents were asked to express their degree of agreement with the statement “the current way of working is convenient” by choosing among 7 boxes⁴³. The majority answered they at least “*somewhat agree*” with the statement (68%); only few of them (26%) were neutral (*Neither agree nor disagree*) and only one respondent “*somewhat disagrees*”. In a sense, it means that the *status quo* is perceived as good and convenient. In Figure 24 a summary of the answers provided is presented.

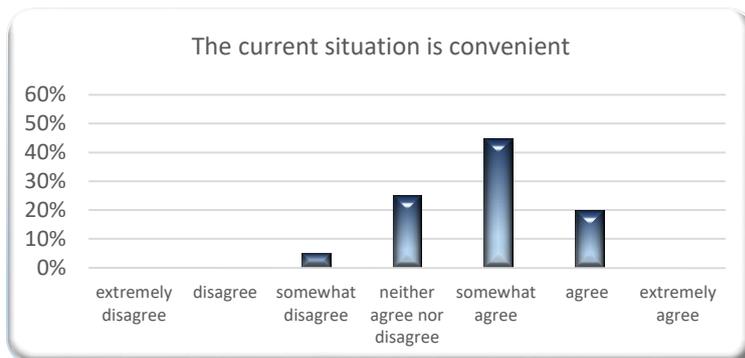


Figure 24. Perceptions of present situation – Antwerp

Furthermore, few store owners highlighted that prices are currently cheap, meaning that one of their main concerns about the solution is the possible price increase.

E) Evaluation of solution proposed

After a brief description of the proposed solution, interviewees were asked to state their level of agreement (from *extremely disagree* to *extremely agree*) with five statements regarding the proposed solution.

In Figure 25 the results of this section are summarised.

⁴³ The Likert scale includes the following 7 levels of agreement; *Extremely disagree*, *disagree*, *somewhat disagree*, *neither agree nor disagree*, *somewhat agree*, *agree*, *extremely agree*.

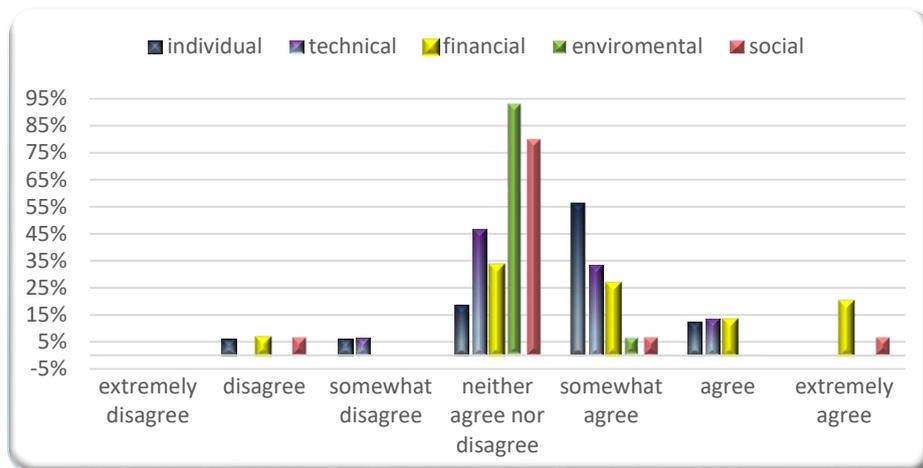


Figure 25. Evaluation of solution proposed - Antwerp

The first main result is that no respondent ever matched the “extreme disagreement”, for any of the five statements, suggesting that they might be interested in the effectiveness of the solution. Another result is the concentration of the answers on the central option; neutrality concerning all the aspects seems a good choice.

The following figures present the results in more detail.

Most of the respondents (69%) at least “**somewhat agree**” about the **individual acceptability** of the solution (with respect to their own private business), while 12% matched a disagreement box (“disagree” or “somewhat disagree”). The remaining 19% selected the “neither agree, nor disagree” option. No extreme boxes were matched.

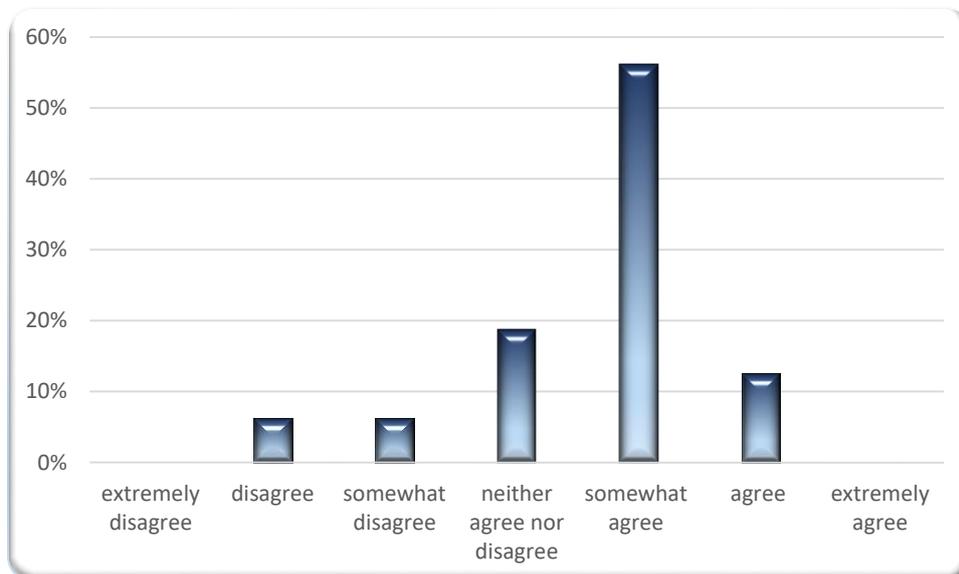


Figure 26. Individual acceptability of the solution - Antwerp

Regarding the left issues, it is quite evident a strong **uncertainty** about the impact and convenience of the solution; actually, the box most frequently matched by the respondents is that of the “*Neither/nor*” answers.

Specifically, as regards the **technical feasibility** of the solution (Figure 27) respondents are equally distributed between the neutral option (47%) and the “agreement” ones (“agree” and “somewhat agree”) (47%); only one respondent (7%) slightly disagrees.

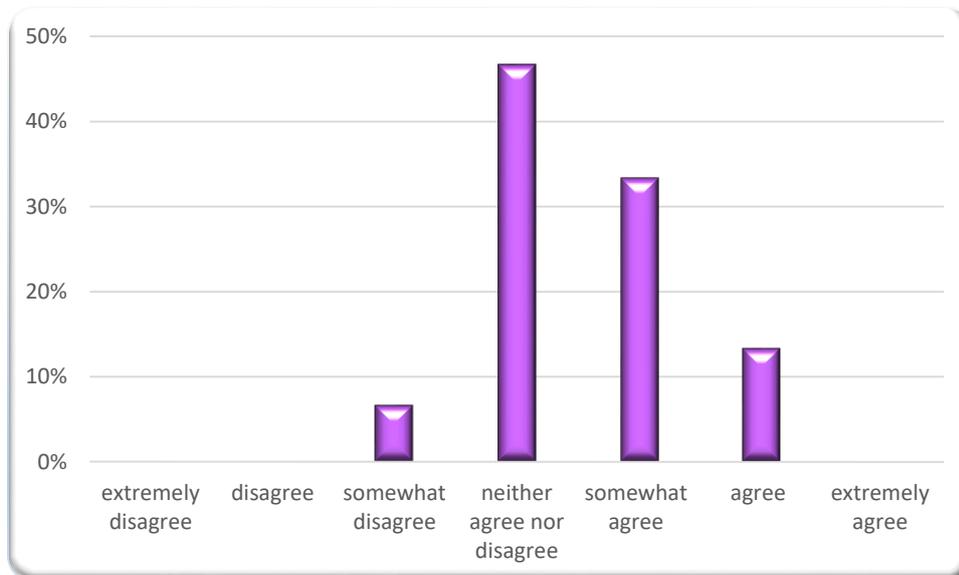


Figure 27. Technical feasibility of the solution – Antwerp

Apart from the neutral 33%, the sample mostly believe in the **financial viability** of the solution (60%) with at least 20% who extremely agree. As a consequence, only 7% of respondents think that the solution proposed is not financially viable (Figure 28).

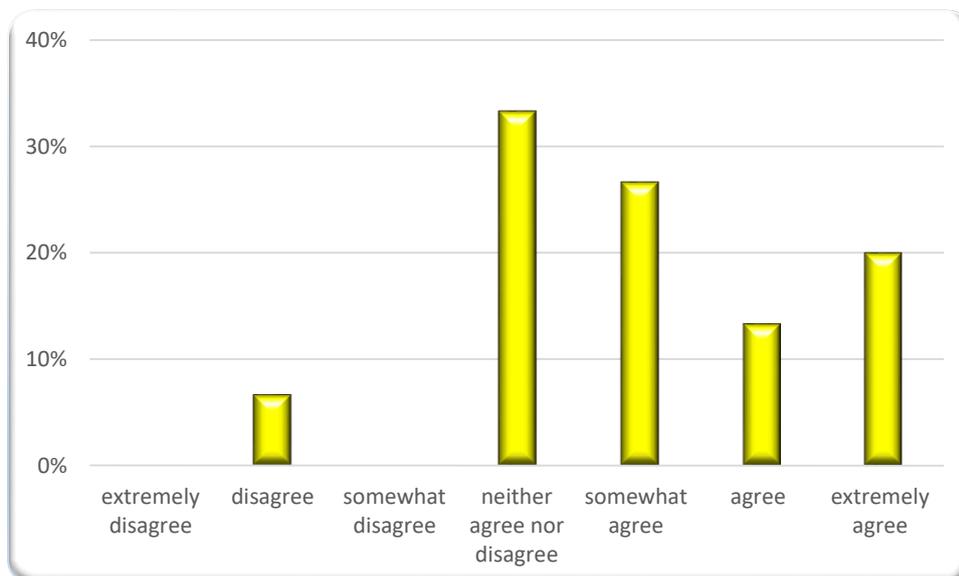


Figure 28. Financial viability of the solution - Antwerp

It is worth considering that most of the scepticism is shown towards the social and environmental aspects related to the solution; uncertainty on the last two issues, with answers concentrated on the central options, is much more evident.

Only 7% of the sample thinks that the solution might generate environmental benefits, by somewhat agreeing with the statement; as a consequence, 93% of respondents have not a clear opinion on this issue (Figure 29).

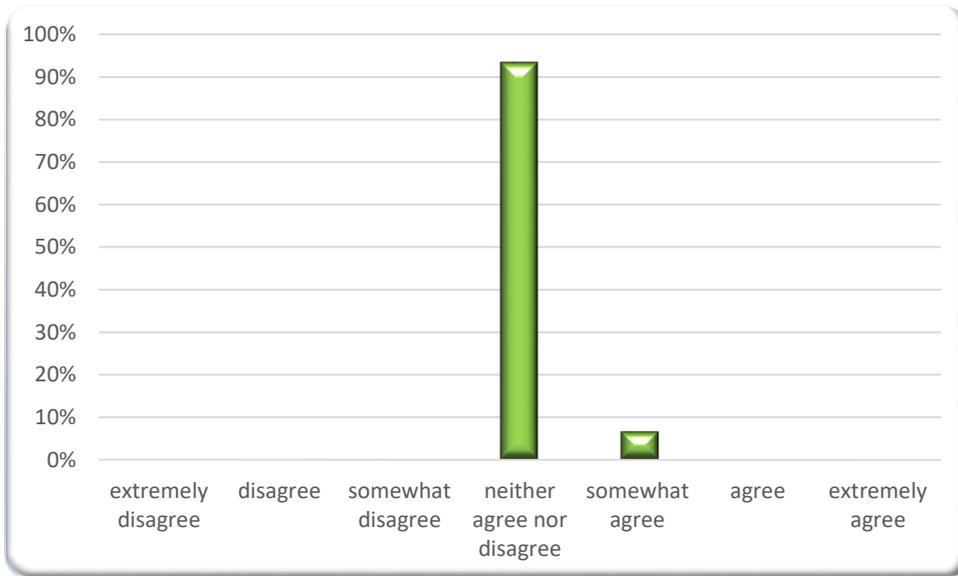


Figure 29. Environmental benefits of the solution - Antwerp

Lastly, concerning the social desirability of the solution (Figure 30), the sample mostly has only a vague idea (80%); out of them, the majority (66%) sees the proposed solution as an improvement for the society as a whole, but someone also disagrees (33%).

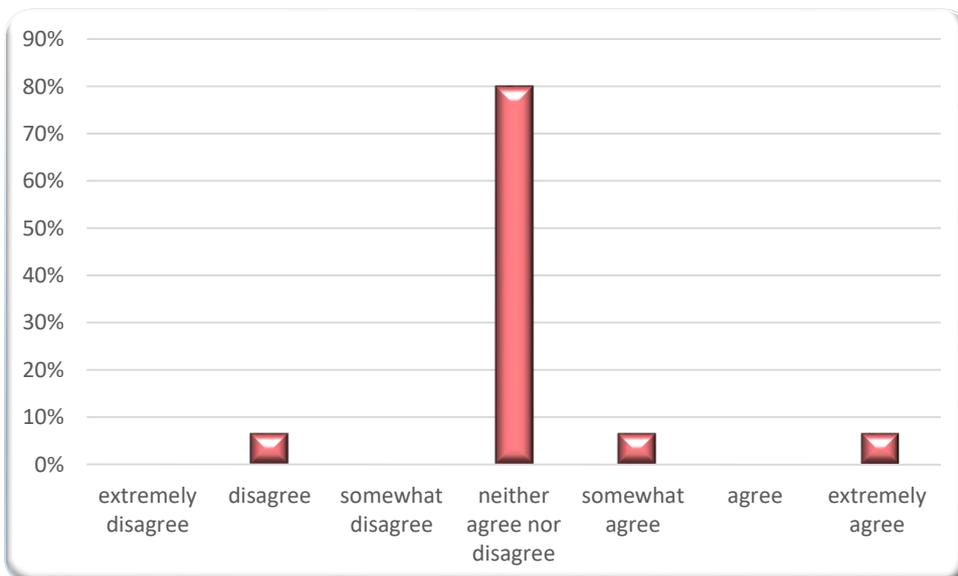


Figure 30. Social desirability of the solution - Antwerp

F) Stated behavioural reaction to the proposed solution

Throughout the questions of this section the interviewees’ willingness to pay for the proposed solution and their stated behavioural reactions are explored.

Asked firstly if they were **willing to order online** some of their merchandise, the whole sample (96% of the store owners) equally splits up into two groups: those who were and those who were not.

Only 38% of respondents replied to the second question about a specific amount that could be paid in case the purchase cost for the merchandise remains the same: the only retailer willing to pay something provided an amount of 200€/month.

Lastly, out of 44% responding to the last question of the section related to the willingness to tell other people about the solution, only 17% is not going to. The remaining 83% is going to diffuse the information about the possibility for store owners to order online and get merchandise by a distributor at a convenient price.

G) Upscaling and transferability of the solution

This section aimed at investigating expectations and perceptions about the transferability of the solution in other contexts.

The first question asked if respondents would be more **willing to order online if multiple consumer goods manufacturers co-operated**, offering a joint service. 59% of interviewees did not provide any answer, while among the remaining 41%, 81% answered yes, meaning they get incentivized by a hypothetical cooperation among manufacturers.

The second one asked, instead, if respondents would be more willing to order online if all fast-moving consumer goods were offered through this type of platform (including fresh food and frozen food). Out of the 70% providing answers, only 21% would not change idea, while the remaining 79% would be more willing to enjoy the solution.

H) Suggestions

In this very last section, few suggestions were provided. According to the critical points identified in Section B, most of them hope for a wider product assortment. Furthermore, other store owners show a certain reluctance to pay orders in advance, i.e. prior to the delivery, thus highlighting the preference towards the possibility to pay cash and when the products are sold. More interestingly, the “grouping” of shops is proposed as an alternative way to get products, in a sort of “car-pooling” adjustment that could reduce the number of trips.

Transferability: Antwerp vs Brussels

Independent stores were visited and investigated in certain neighbourhoods of Antwerp by two employees of the service-driven that was going to supply products. The sample size is almost the half of that in Brussels, due not only to a certain difficulty in finding store owners willing to spend their time and efforts in answering to a survey, but also to the fact that in Brussels a sales representative collected the data, maybe being more convincing. Nevertheless, the willingness to respond to single questions in Antwerp appears higher. As already mentioned, Brussels has about 900 independent small grocery stores which, on average, replenish stock twice per week, mostly combining deliveries by a distributor with pick-ups at many different wholesalers. Who is already getting merchandise delivered by a distributor, chooses them mainly based on the availability of promotions, without considering the transport of the goods received as a cost. Neither those going also to the wholesalers – who usually do not have to close their shops during purchases - consider these purchasing trips as a cost.

In Antwerp, instead, most of the store owners go exclusively to (one) wholesaler; they usually buy from the same one, on average travelling 2/3 times a week for 2h/2h30' without being compelled to close the shop (due to the presence of employee or trip hour): again, the trip is not considered as a cost.

According to this short comparison of the two *status quo*, Antwerp could apparently seem a good candidate for the CITYLAB solution.

This resulted not only in the willingness to respond to the questions on replenishment habits, but also in exploring the interest for the project.

Asked to provide motivations for participating in the solution, thus having the goods delivered in an alternative way, both in Brussels and in Antwerp respondents showed to appreciate the simple system usage. Since the lack of interest for the initiative was quite clear-cut (52% in Brussels and 41% in Antwerp), some motivations were also provided for not being interested in participating in the project: lack of convenience and payment in advance (prior the delivery) were the main obstacles in Brussels, while in Antwerp the limited product offer may dissuade store owners from participating, followed by digital divide and language barrier. Participation in such projects seems much more relevant in Antwerp in terms of decreasing costs, while the two cities have a similar opinion on the possibility to obtain more convenient deliveries. Neutrality option, instead, is related to sustainability issue granted by the solution according to Brussels respondents; for the store owners in Antwerp, instead, it turns out to be relevant.

In conclusion, Brussels is demonstrating lower interest in the theme compared to Antwerp.

This is confirmed also considering that 1/3 of the interviewees in Antwerp did not provide any answer to a simple question about the convenience of the current system, this percentage almost doubling in Brussels. Among the remaining, the majority (almost 70%) in Antwerp at least *somewhat* appreciate the situation, while in Brussels those at least “somewhat” satisfied with the present delivery system are the half of the responding store owners.

Concerning the evaluation of the solution, if in Brussels respondents might seem not very sure about their judgements, in Antwerp, again, they seem to trust the effectiveness of the solution; in any case, in both cities they prefer to remain neutral about “not economical” aspects such as environmental and social benefits.

In more detail, more respondents in Antwerp than in Brussels (69% vs 40%) “somewhat” consider the solution individually acceptable; Brussels store owners, instead, rather disagree for the most (44%).

In Antwerp the solution seems technically feasible for nearly all the sample, while the respondents in Brussels have very different opinions.

The big difference between the two cities is related to the evaluation of the financial viability which convinces only the majority of store owners in Antwerp, while it worries most of the Brussels retailers.

Lastly, in both cities uncertainty about the outcome of the solution results in evaluating possible benefits for environment and society: central options (neutrality) are the most matched. Nevertheless, in this case, Brussels seems more convinced than Antwerp at least of the environmental impact of the solution.

All in all, stated behavioural reactions are very similar for the two cities, where the respondents, asked about the possibility to adopt the CITYLAB proposal, quite equally split up into two groups: those willing to order online some of their merchandise, and those not. As regards the willingness to pay for the proposed solution, the two cities behave quite at the same way: if in Brussels none is willing to pay, in Antwerp only 1 store owner would give 200€/month. Nonetheless, Antwerp retailers would tell other store owners about the solution, for the most.

Again, the two cities would appreciate cooperation among multiple consumer goods manufacturers, and, in Antwerp, also the possibility to order other kind of goods, even such as fresh food and frozen food.

In both cities retailers are reluctant to pay orders in advance and dissatisfied with the small product assortment; furthermore, in Brussels they suggested adding promotions, while in Antwerp, a retailer also proposes the “grouping” of shops as an alternative way to get products, in a sort of “car-pooling” adjustment for reducing the number of trips.

In conclusion, Antwerp seemed more interested on and convinced of the solution than Brussels; on the other side, when P&G also launched the solution there, found that retailers made the same objections against it: out of the 27 stores visited, no orders were placed after the first visit. If it is true that in some stores in Brussels needed a second visit for ordering,

P&G also realized that it would not be viable to supply just two or three stores. Once again, the survey was very useful to them in order to identify the main reasons for (not) participating in the implementation.

Apart from practical suggestions, all things considered, it is possible to conclude that Antwerp seems to appreciate the solution more than Brussels, thus suggesting, from a behavioural perspective, a potential successful transferability process.

6.2 Milan replicating Rome: Integration of direct and reverse logistic flows

The Rome Living Lab proposed a solution for integrating direct and reverse logistic flows in urban areas, whose aim is to improve clean recycling waste collection while also minimizing the amount of transport-related CO₂ emissions.

The main idea was to involve the national postal operator (Poste Italiane), already delivering mail/parcels to the University of Roma Tre, to pick up boxes of recycled plastic caps during the same transportation route, thus increasing vehicle load factors and reducing vehicle externalities, such as congestion and pollution (air and noise).

In order to check some geographical fixed effects and the replicability of the solution in other cities, the ex-ante analysis has been conducted in two different universities of Milan, where the following system is proposed: the national postal operator, while delivering mail/parcels to the University, picks up full boxes of clean wastes directly from the addressee during its transportation route and delivers them to a central collection point. The aim is twofold: on one side, to increase/improve recycling and correct waste disposal; on the other to reduce transport negative externalities by avoiding dedicated trips.

This survey explores the possibility to transfer in Milan universities this innovative solution from a behavioural point of view; to this aim, information among students and people working at the university has been collected.

A) Type of interviewee

The survey has been carried out in two different Universities and locations: Università degli Studi di Milano (hereinafter UNIMI), located in the very centre of Milan, near the Duomo church; and Polytechnic of Milan (hereinafter POLIMI), in the learning centre of Lecco, a small city in the North of Lombardy, which is 40' far from Milan by train. The questionnaire, which is very similar to the one used in Rome, was fulfilled by 3 members of the administration, 3 professors and 166 students, being the rate of response of 87%.

The sample structure is described in Figure 31.

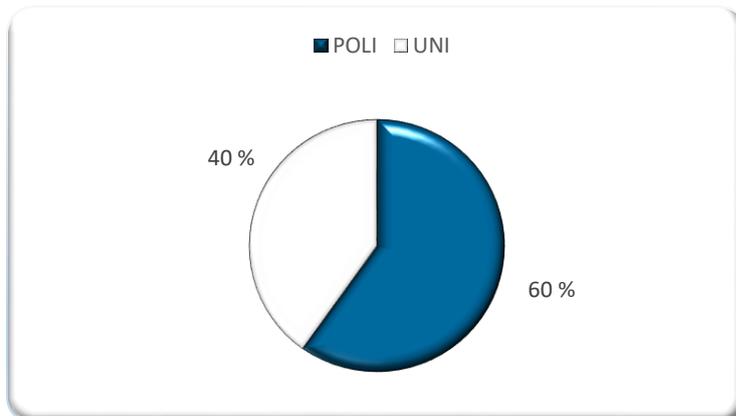


Figure 31. Sample structure by university

B) Awareness and importance of the issue

This section is structured in two questions.

In the first question, respondents are asked to provide up to three motivations for participating in a Living Lab project and cooperating for a better waste disposal system.

Interviewees showed a huge enthusiasm for the survey: indeed, they mostly provided three motivations each and only one student did not provide any.

After being classified by general issue, main results are presented in Figure 32.

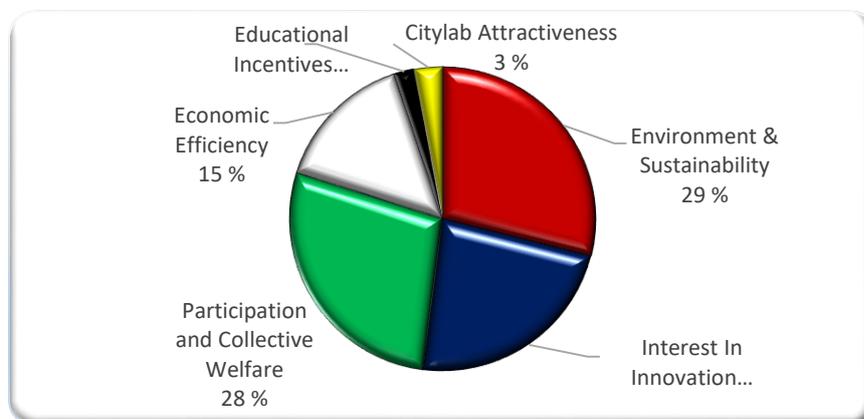


Figure 32. Motivations for participating in the Living Lab

As expected, the interest for sustainable initiatives is the most frequent motivation (29%), followed by the possibility to be part of a sensitizing campaign and to participate in a collective welfare improvement (28%). Interestingly, curiosity and innovation atmosphere are also identified (23%); the motivation related to the achievement of efficiency has been quoted in 15% of the cases. 3% of the respondents are explicitly attracted by the CITYLAB project⁴⁴.

More marginally, some other motivations have been indicated, such as the aesthetic improvement of the university and urban area; the eventual increase in employment; the development of a replicable solution.

The second question of this section aims at measuring the importance respondents attach to the recycling for itself, the recycling for charitable matters, the recycling process supported by an environmentally friendly waste transportation system.

According to Figure 19, which summarizes the 1-7 Likert scale results of question B2, recycling is mostly considered at least *somewhat relevant* (on average 90%)⁴⁵.

This confirms not only the relevance of the issue investigated, but also the willingness to participate in the survey.

Going in depth, the *relevant* box has been matched most frequently than the others, for every question; nonetheless, the “extreme” option was preferred more than the *somewhat* one only when dealing with the environmental topic.

Actually, 14% of the sample considers the charity characterization neutral or irrelevant; only 7% would neglect the green aspects, instead.

⁴⁴ The link for the questionnaire provided also the link for the whole project.

⁴⁵ The Likert scale used is articulated in 7 levels, namely: *extremely irrelevant*, *irrelevant*, *somewhat irrelevant*, *neither*, *somewhat relevant*, *relevant*, *extremely relevant*.

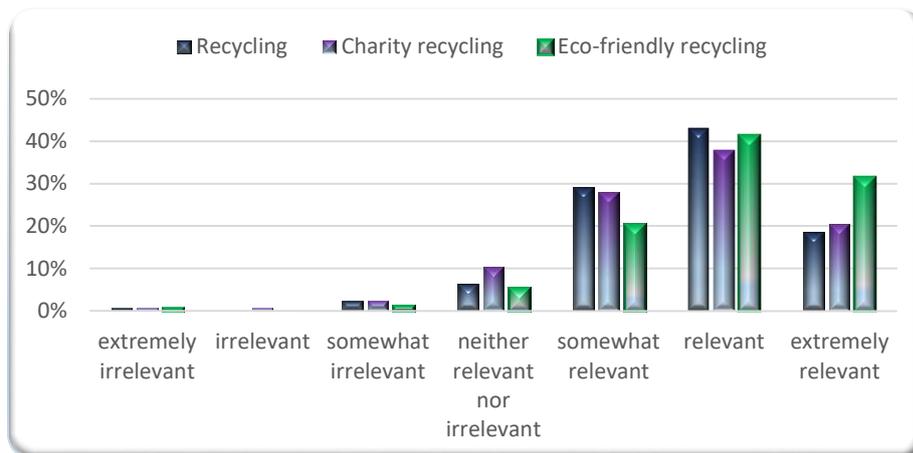


Figure 33. Importance of recycling initiatives by typology – Milan

So, given that everyone agrees on the importance of recycling, it is possible to say that the green-oriented initiatives seem slightly more relevant than the charity-aimed ones.

C) Characterisation of present behaviour

The third section of the questionnaire administered in Milan was slightly different from that administered in Rome where a specific recycling experiment dealing with plastic caps is already taking place. Therefore, in Milan the current interviewees’ behaviour and their waste disposal habits/arrangements have been investigated.

Specifically, the sample had to choose among 5 different levels of frequency for some of their actions. To this aim 9 questions were posed, whose answers have been separately elaborated in 3 different groups: green attitudes, voluntary green actions and waste disposal habits.

Results of this analysis are presented in the three following figures below.

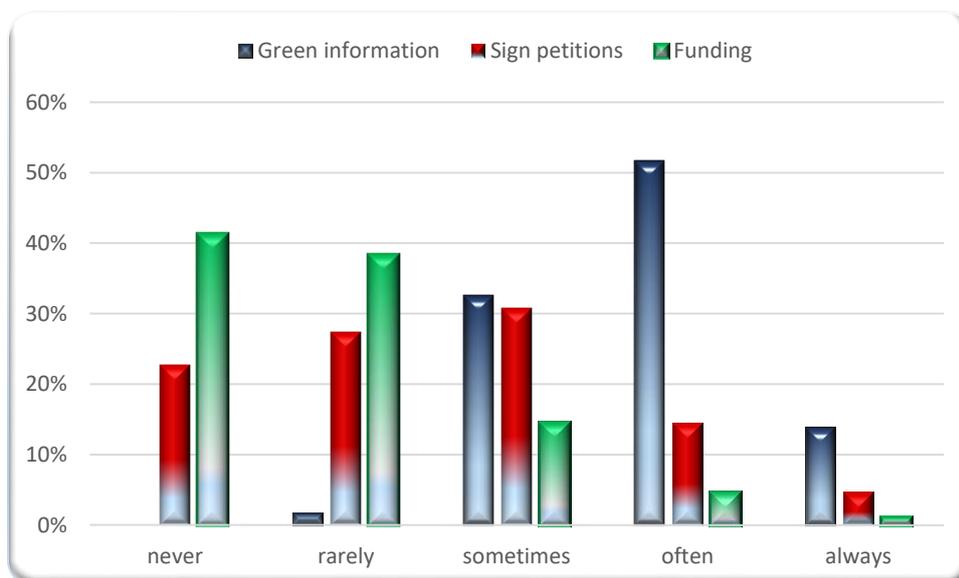


Figure 34. Current behaviour: green initiatives – Milan

First of all, respondents were asked to say how often they deepen their knowledge of environmental issues; sign petitions concerning the environment; fund associations or groups acting for the environment.

As expected, respondents are more willing to spend their time in studying an environmental problem than their money to solve it; providing own data (when signing) is not very much appreciated as well.

More specifically, 66% of the sample gets information about environmental topics more than “sometimes”, while only 19% signs a petition and 6% gives money to fund initiatives for the environment with the same frequency. Not surprisingly, 80% never or rarely funds green initiatives, 50% never or rarely sign for environmental petitions and only 2% rarely looks for information about the issue.

In the second group of answers analysed (Figure 35), the “green behaviour” of the respondents is explored; specifically they were asked if they collect wastes left lying about by other people; if they prefer sustainable mobility; if they recycle other materials in addition to those recommended/indicated by the local administration.

The respondents mostly collect others’ waste sometimes or often (71%); only 7% always do it. Focusing on mobility aspects, only 20% never or rarely prefer mobility means less polluting than private car. On the contrary, they are not so willing to recycle different materials in addition to those usually collected for recycling: 1 out of 4 interviewees never collect other recycling waste, another 26% rarely does it, and 30% does it sometimes.

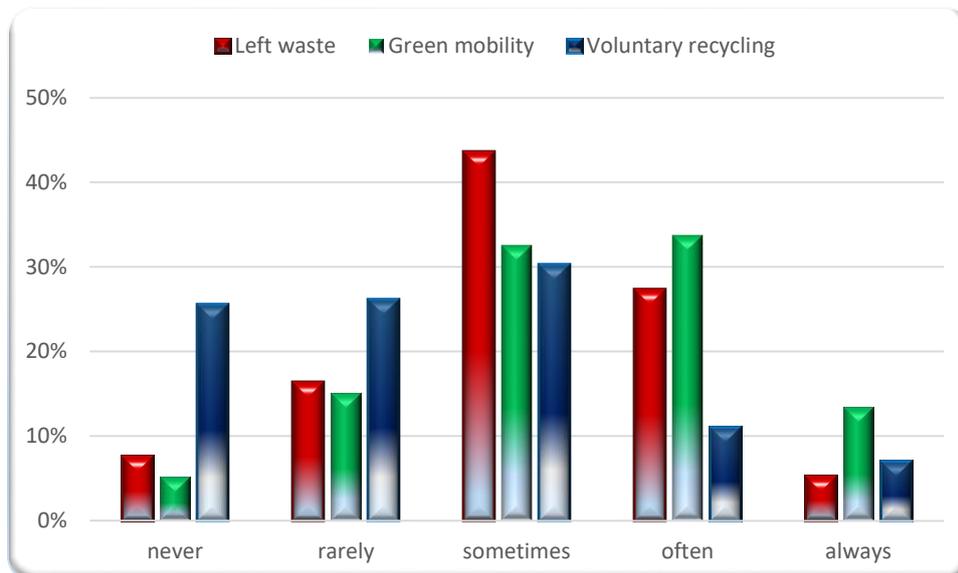


Figure 35. Current behaviour: voluntary green actions – Milan

Lastly, the waste disposal and recycling habits are investigated by asking the frequency of waste collection at home and at the university; furthermore, in order to test the feasibility and convenience of the solution, respondents are also asked to say if and how often they use to bring any specific waste from their home to the university.

Actually, some kind of waste could be collected in a specific place; if the university is the everyday destination for purpose of work or of study, maybe it could be more comfortable than other place which would need a dedicated trip.

In this case, the results are very clear: the percentage of those always recycling is 90% at home and 69% at the university, due to the fact maybe, that some waste can't be recycled at the university (e.g. food). On the contrary, most of the respondents (70%) are never bringing waste from their houses to their place of work and study; only few of them (22%) are doing it rarely or sometimes.

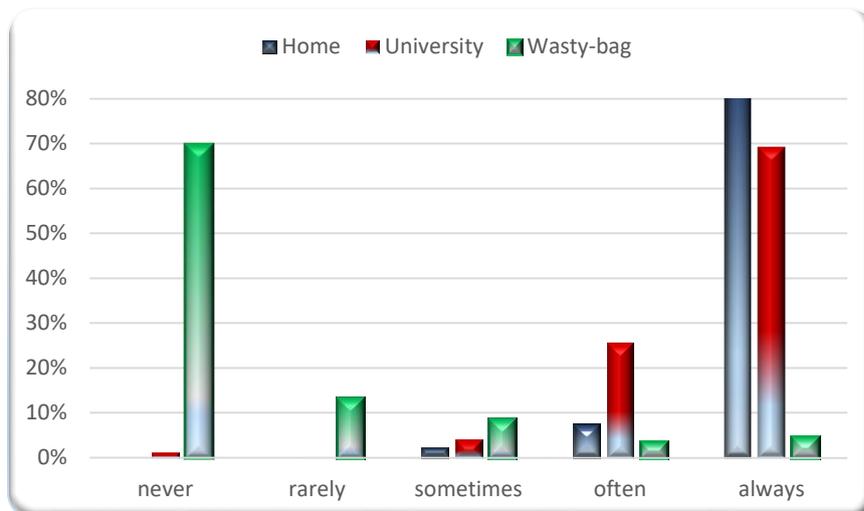


Figure 36. Current behaviour: waste disposal – Milan

D) Perceptions of present situation

In this Section, respondents are asked not only to say how much they agree with a statement about the organization of the current system, but also to list critical aspects.

The present situation is considered as well organised (at least *somewhat agree* option was matched) by 62% of the sample, while the opposite is true in 23% of the cases.

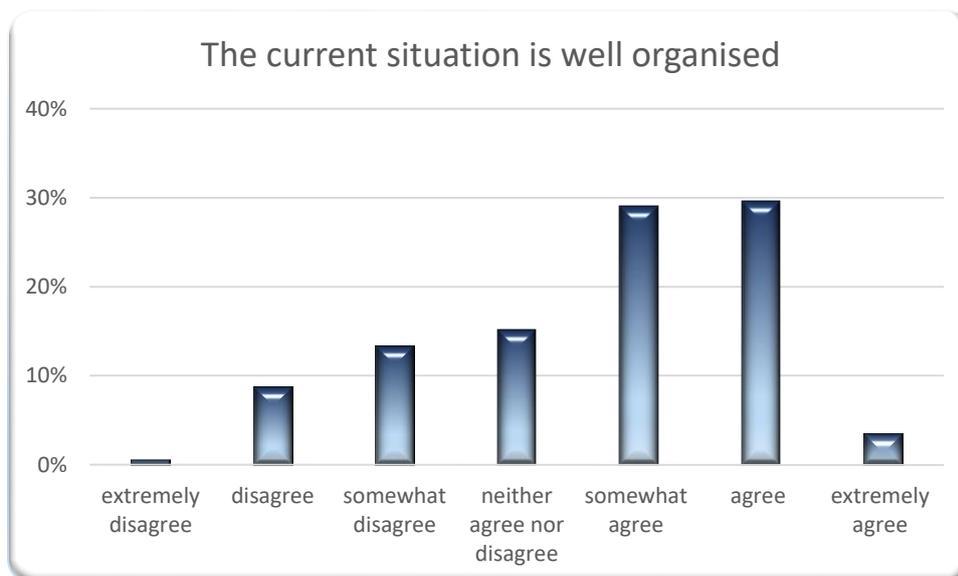


Figure 37. Level of agreement with the statement: "The current system is well organised" - Milan

Only 2% of the sample did not answer to the second question, while 10% answered they did not find any critical aspects; lastly, 4% gave very general suggestions about the efficiency of the system.

Among the others, everyone has indicated at least a problem to cope with. So far, the critical issues related to the *status quo* situation are grouped as follows:

- 1) an inefficient system of waste disposal, in terms of collection frequency, which leads to high probability of finding full boxes where no additional wastes can be deposited (4%); number

and size of bins (21%); inequality in the distribution of bins among the different university sites and the lack of bins inside the classrooms (29%);

2) the lack of bins for specific waste, such as food, aluminium (cans), batteries (29%);

3) the lack of information about the system (12%);

4) the (wrong) behaviour of students (26%) and cleaning service employees' (9%).

This information could be used to build up an improved and feasible recycling system.

After the perception of the current situation, sections E, F and G report perceptions on the solution proposed.

E) Evaluation of solution proposed

The proposed solution was briefly described following the one adopted in Rome

“Suppose a new system for collecting recycling material is made available. In more detail, it can be deposited only in small boxes at the entrance of the building. Poste Italiane, while delivering mail/parcels to the addressee, picks up the (full) boxes directly from the addressee during their transportation route and delivers them to the central collection point”

According to this description, respondents state their level of agreement with 5 statements concerning different expected benefits from the initiative, that should be:

- 1) individually acceptable;
- 2) technically feasible;
- 3) financially viable;
- 4) environmentally beneficial;
- 5) socially desirable.

As it emerges from the figure below, they almost all *somewhat agree* with any if these statements.

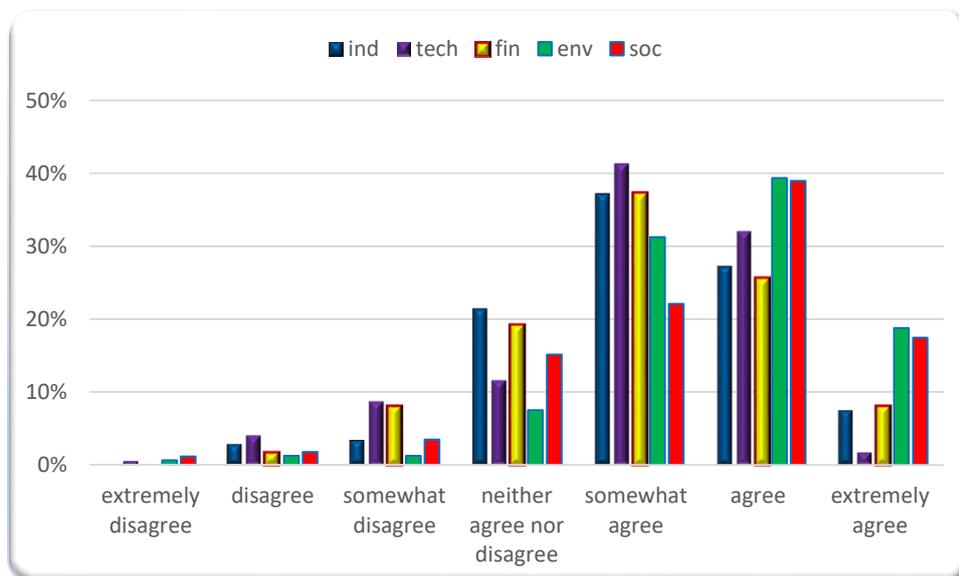


Figure 38. Evaluation of the solution - Milan

In more detail they are a little bit more convinced about the environmental and social benefits and just a little less about the financial viability.

F) Stated behavioural reaction to the proposed solution

This section of the questionnaire investigates the interviewees' willingness to pay for the proposed solution and their stated behavioural reactions.

Interestingly, 81% of the sample states that if the new solution were implemented, they will participate in the initiative of collection "clean wastes" at the university also increasing the amount of material actually recycled. Additionally, all interviewees will try to involve more people in the initiative.

Although this enthusiasm, 67% of the sample is not willing to pay for the solution; among them 38% thinks that others, i.e. the public sector, should pay.

The few willing to pay would pay on average 15 euros per year (min 5€, max 600€) for this environmentally sustainable solution.

G) Upscaling and transferability perceptions

Interviewees show a widespread optimism with respect to the: (i) likelihood that the proposed solution would increase the number of people involved in the initiative (and, as a consequence, the number of plastic caps collected) (90%); (ii) the possibility that the system could be extended outside the university boundaries *via* awareness campaigns in other public large buildings such as schools, hospitals, city departments and neighbourhoods, shopping centres and sports facilities (76%); (iii) the possibility to extend the solution to other materials for recycling, reuse or simply for finding a suitable place where to throw it (71%).

H) Suggestions

The general enthusiasm towards the questionnaire is confirmed by the amount of suggestions provided in the last section which mostly deals with a better information and communication campaign.

Transferability: Milan vs Rome

What firstly emerged from this new analysis is that, even from two very different starting points in terms of waste disposal, the lack of information is considered the most critical point; as a result, the easier and more logical tool for improving the situation seems to build a good information campaign.

Moreover, both in Rome and Milan the scepticism towards the correct collection process suggests more controls than incentives; on the contrary, the trust in replicability is also shared between the two cities.

Despite the higher willingness to recycle more, in Milan respondents are less willing to pay, probably due to the higher level of efficiency (and related fiscal burden already paid by the community) achieved by the public service.

A further point worth being explored should be the different attitude towards recycling depending on the age of respondents; in this sense, a wider survey should be carried out, provided that the process of distribution is often unknown among students because someone else (e.g. family member) is handling waste; nonetheless, according to the students' answers, laziness and low interest for recycling are much more widespread in Rome than in Milan.

In conclusion, the Rome solution seems to have, from a behavioural point of view, good chances to be transferred to Milan.

7 Conclusions on behavioural analysis for transferability of solutions

The second part of this deliverable focused on the transferability of the CITYLAB solutions both within and outside the Living Labs cities, under a behavioural perspective.

In other words, it explored any behavioural difference and commonalities among different Living Labs stakeholders' perception of the solution. To this aim, the ex-ante behavioural analyses already performed, whose results had been presented in CITYLAB (2018a), have been replicated in different cities. The results of each new survey have been then compared to the ones of the city where the solution was originally evaluated.

Broadly speaking, the data comparison between different cities is never easy. It is worth underlining that results are obviously subject of individual judgment: in many cases the sample of the replicating city is smaller than the original one (Brussels, Paris and Southampton, Antwerp); in other cases (Brussels and Amsterdam) only 1 person was interviewed. However, the analyses performed can provide very useful suggestions for testing its potential successful adoption elsewhere.

According to this, the results of this transferability analysis can be summarised as follows.

As expected, Living Lab original city stakeholders appear more committed about the purposes of the solution proposed. Nevertheless, the “transferred” cities seem to be very attracted by the innovative nature of solutions (e.g. the Rome integration of direct and reverse logistics in London, or the Amsterdam freight-bike system in a city like Rome where “none uses its bike”). Furthermore, when answering about improving efficiency, the key drivers mainly concern locations for the solution (Brussels and Oslo) and the possibility to save time (e.g. Amsterdam), thus in a community perspective; most of the complains are about the lack of a good information system (e.g. Milan, Antwerp, London).

Quite surprisingly, none seems to be worried about replicability of the solution despite a certain scepticism when the same solution is proposed in his/her own city.

Less heterogeneity occurs when respondents are similarly categorized, while demand-side solutions seem more disputable than supply-side ones.

Notwithstanding no generalization can be proposed, some solutions, whose acceptance level appears high and shared should apply for potential successful replicability; those which were not appreciated in both the cities, instead, are worth being at least revised.

In conclusion, according to the behavioural analyses performed, the initiatives implemented initially in Amsterdam, Brussels and Rome seem very good candidates for being transferred (respectively to Rome, Paris and London), while less so for London and Southampton solutions (respectively to Oslo and Amsterdam). Additionally, it is worth noticing that transferability among cities within the same country seems more likely to be successful, albeit – to this aim – further investigations should be carried out.

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Appendix: Behaviour change/willingness to pay analysis – Questionnaires

EX-POST QUESTIONNAIRE - BRUSSELS

1. Type of interviewee
 - Storeowner
2. Have you participated in the “ex-ante survey”?
 - Yes
 - No
3. After adopting the solution, my impression is that the solution is:

	Extremely disagree	Disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Agree	Extremely agree
1. <i>Individually acceptable</i>							
2. <i>Technically feasible</i>							
3. <i>Financially viable</i>							
4. <i>Environmentally beneficial</i>							
5. <i>Socially desirable</i>							

Explanation of terms used in above table

“Individually acceptable” = in replying to this item interviewees should refer to the acceptability of the solution proposed with respect to their own private business.

“Technically feasible” = in replying to this item interviewees should refer to the technical feasibility of the solution proposed assuming a similar or better level of service quality compared to the status quo situation.

“Financially viable” = in replying to this item interviewees should refer to the self-sustaining capabilities of the business model implied by the solution proposed especially without the need for public subsidies.

“Environmentally beneficial” = in replying to this item interviewees should refer to the expected impact the solution proposed will overall have on the environment.

“Socially desirable” = in replying to this item interviewees should refer to the implications the solution proposed will have with respect to socially valuable issues from the interviewees’ perspective (one could possibly also ask which are the socially relevant issues considered in evaluating the innovative solution as “desirable”).

4. How important was the practical adoption of the solution in influencing the judgments expressed in question #3?

Extremely Low	Low	Somewhat Low	Neither Low nor High	Somewhat High	High	Extremely High

5. Could the solution be improved?

- No, it is ok
- Yes, but only marginally
- Yes, some elements can be improved
- Yes, there are large margins for improvements

5.1. If yes, which specific elements?

5.2. For each element, please provide some suggestions on how to improve it.

6. You most likely will...

- adopt the solution in the short run
- adopt the solution in the medium run
- adopt the solution in the long run
- not adopt the solution

7. Please motivate the answer for question 6.

8. Would you recommend the solution to colleagues?

- Surely
- maybe yes
- maybe not
- surely not

9. For which type of shop would this be a good solution?

10. Does the solution require/imply behaviour changes?

- Yes
- No

10.1. If yes, how much?

Extremely Low	Low	Somewhat Low	Neither Low nor High	Somewhat High	High	Extremely High
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10.2. Please explain which type of behaviour change and effort level adopting the solution required.

10.3. What are the main drivers that have spurred behaviour change?

- 1) _____
- 2) _____
- 3) _____

10.4. What are the main constraints that have hindered behaviour change?

- 1) _____
- 2) _____
- 3) _____

11. Would you be willing to pay for having this environmentally sustainable solution?

- Yes
- No

11.1. If yes, how much per delivery? _____-€

11.2. If not, do you think others should pay?

- Yes
- No

11.2.1. If yes, who should pay?

11.2.2. ...and how much? _____ €

THANKS FOR YOUR COLLABORATION!

EX-POST QUESTIONNAIRE - ROME

1. Type of interviewee
 - Personnel
 - Student

2. Have you participated in the “ex-ante survey”?
 - Yes
 - No

3. After adopting the solution, my impression is that the solution is:

	Extremely disagree	Disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Agree	Extremely agree
6. Individually acceptable							
7. Technically feasible							
8. Financially viable							
9. Environmentally beneficial							
10. Socially desirable							

Explanation of terms used in above table

“Individually acceptable” = in replying to this item interviewees should refer to the acceptability of the solution proposed with respect to their own private business.

“Technically feasible” = in replying to this item interviewees should refer to the technical feasibility of the solution proposed assuming a similar or better level of service quality compared to the status quo situation.

“Financially viable” = in replying to this item interviewees should refer to the self-sustaining capabilities of the business model implied by the solution proposed especially without the need for public subsidies.

“Environmentally beneficial” = in replying to this item interviewees should refer to the expected impact the solution proposed will overall have on the environment.

“Socially desirable” = in replying to this item interviewees should refer to the implications the solution proposed will have with respect to socially valuable issues from the interviewees’ perspective (one could possibly also ask which are the socially relevant issues considered in evaluating the innovative solution as “desirable”).

4. How important was the practical adoption of the solution in influencing the judgments expressed in question #3?

Extremely Low	Low	Somewhat Low	Neither Low nor High	Somewhat High	High	Extremely High

5. Could the solution be improved?
 - No, it is ok
 - Yes, but only marginally
 - Yes, some elements can be improved

- Yes, there are large margins for improvements

5.1. If yes, which specific elements?

5.2. For each element, please provide some suggestions on how to improve it.

6. You most likely will...

- adopt the solution in the short run
- adopt the solution in the medium run
- adopt the solution in the long run
- not adopt the solution

6.1 Please motivate the answer for question 6.

7. Would you suggest adopting the solution to other people?

- Surely
- maybe yes
- maybe not
- surely not

8. Do you consider the solution transferable to other city/contexts?

- Yes
- No

8.1 If yes, which cities/city-characteristics?

9. Does the solution require/imply behaviour changes?

- Yes
- No

9.1. If yes, how much?

Extremely Low	Low	Somewhat Low	Neither Low nor High	Somewhat High	High	Extremely High
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9.2. Please explain which type of behaviour change and effort level adopting the solution required.

9.3. What are the main drivers that have spurred behaviour change?

- 1) _____
- 2) _____
- 3) _____

9.4. What are the main constraints that have hindered behaviour change?

- 1) _____
- 2) _____
- 3) _____

10. Would you be willing to pay for having this environmentally sustainable solution?

- Yes
- No

10.1. If yes, how much per year? _____-€

10.2. If not, do you think others should pay?

- Yes
- No

10.2.1. If yes, who should pay?

10.2.2. ...and how much per year? _____ €

THANKS FOR YOUR COLLABORATION!