

Elective DDM110
Design for Behavioural Change
Quartile 1 2023-2024

Word count: 4804

ENVIRONMENTAL RESTRUCTURING OF THE SELF-CHECKOUT TO REDUCE SHOPLIFTING AMONG STUDENTS

Group 8

Ioana Maria Caramiciu

Susan Draaijer

Rosanna Henstra

Haoyu Liu

Jochem Verstegen

Table of Contents

1. Introduction.....	2
2. Design Process and Concept Description	2
3. Implementation Design Rationale	3
4. Theoretical Rationalization for Design Concept	5
Theory of planned behaviour	5
Mechanism of change	5
5. Ethics Analysis of Design Concept.....	6
6. Evaluation Plan	6
7. Prototype and Empirical Evaluation.....	8
Research protocol.....	8
Methods & results of the empirical evaluation.....	8
Focus groups.....	9
Online survey questionnaire.....	9
Observation scheme.....	10
8. Discussion.....	10
9. Conclusion.....	11
10. References.....	12
Appendices	12
A. Individual Contributions	12
B. Research protocol	14
C. Transcriptions Focus Group Questions.....	16
D. Online survey questionnaire.....	22
E. Observation schemes.....	33
F. ERB Form.....	39
G. Informed Consent form – file.....	52

1. Introduction

"One in five people admit to stealing items at supermarket self-service checkouts, adding up to £1.6bn worth of items every year" (Cosslett, 2014). With the arrival of self-checkouts, a new stealing behaviour has occurred. Currently, with the rising prices due to inflation, this behaviour is even getting more popular among students, resulting in an increasing loss for supermarkets (Nesselaar, 2022). By focusing on small supermarkets that make use of self-checkouts, this project tries to change the stealing behaviour of students. Helping all stakeholders involved: retailers, customers, store employees, law enforcement, competitors, and suppliers.

Currently, shoplifters (in this project focused on students) do not scan all items at the self-checkout, to steal these items from supermarkets. With this project, we attempt to change the (not) scanning activity of students that results in stealing. This leads to the following target behaviour: When using the self-checkout at supermarkets, customers will scan all their items before paying and exiting the store.

The stealing behaviour, in this case, is often caused by the ease of doing so. Current self-checkouts offer a lack of visibility for others due to their layout. Explorative research confirms the ease of not scanning items and acknowledges that when students are more likely to get caught, they will be less likely to perform the behaviour (Appendix, D). Additional interviews show the rationalization of stealing at supermarkets. "I think it's okay to steal from big companies, they make enough anyway." (Weel, 2023). The explorative research also shows arguments in favor of stealing behaviour. Focussing on the societal problems students already must deal with, like inflation and high student loans (Appendix, D). This ease of stealing and rationalization of the behaviour could be changed by focusing on the Theory of Planned Behaviour. Furthermore, intervention methods like environmental restructuring could reduce the ease of stealing and rationalization by making it more visible for others to see the behaviour.

2. Design Process and Concept Description

The design process involves a combination of divergent and convergent thinking following the Double-Diamond framework. Figure 1 showcases a summary of the following design process, divided into five main phases. Starting from defining the target behaviour (When using the self-checkout at supermarkets, customers will scan all their items before paying and exiting the store), we diverged to gain a better understanding of the behaviour's context and identify the intervention options, following the 3 stages of the Behaviour Change Wheel approach by Michie et al. (2011). After the first three stages, the design goal was developed (raise awareness about stealing behaviour through environmental restructuring), which was followed by ideating and choosing the final concept design. The final concept (see Figure 2) focuses on changing the current self-checkout layout to a circular self-checkout with lowered screens and barcode scanners. Through these changes, the concept aims to create more transparency and remove the physical barriers that hide customers' actions. Additionally, the customer will be required to move the products from one side to another while scanning, making the motion bigger and more visible.

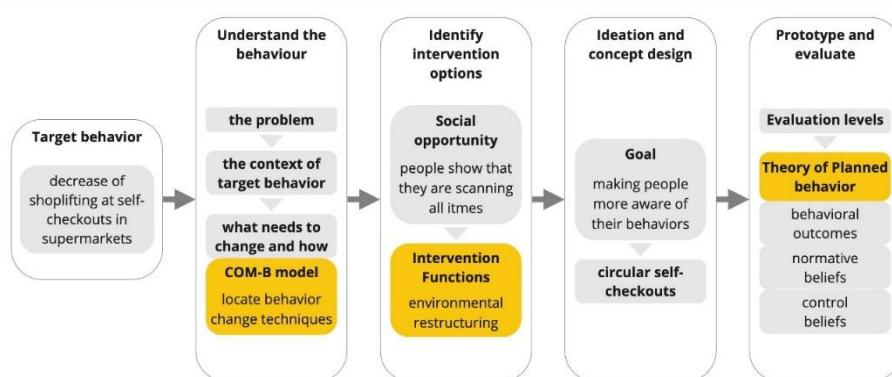


Figure 1: The five phases of the entire design process

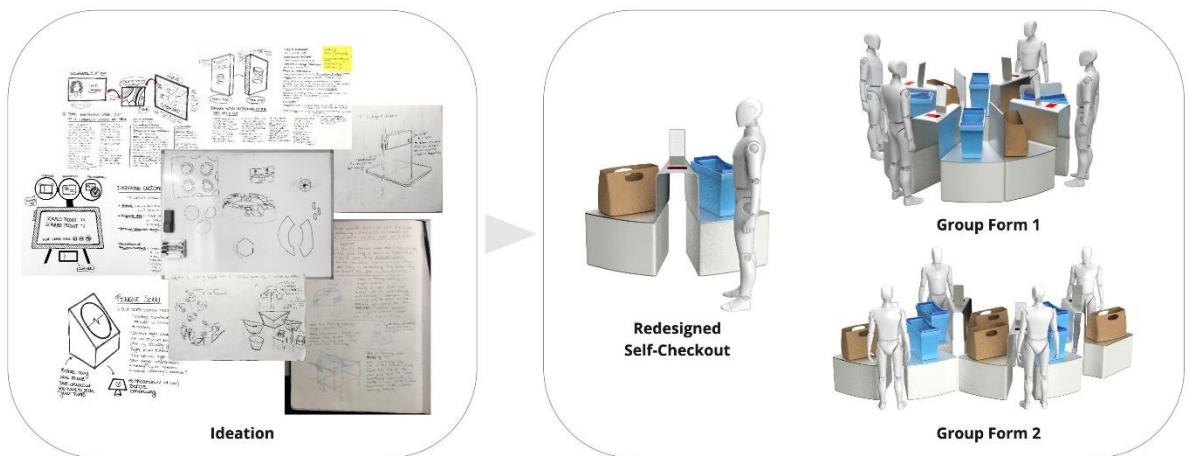


Figure 2: From concept ideation to the final design

3. Implementation Design Rationale

Before the desired change was stated, the target behaviour was elaborated and specified by expanding a brief description of the behaviour, by filling the template table suggested by Michie et al. (see Table 1). The table below was used to elaborate the scenario of the target behaviour capturing the experience of a customer scanning every product before paying at a self-checkout in grocery store.

Table 1: Specify target behaviour in Behaviour Terms

Target behaviour		Not stealing at self-checkouts
Who needs to perform the behaviour?	Customers (students) paying at self-checkout.	
What do they need to do differently?	Scan every product they bought and pay for all of them.	
When do they need to do this?	When checking out.	
Where do they need to do this?	At self-checkout points in grocery stores (and other stores with self-checkouts)	
How often do they need to do it?	Whenever they scan and pay.	
With whom do they need to do it?	Mostly on their own, sometimes accompanied or with the staff.	

Table 2: COM-B behaviour analysis of the target behaviour

COM-B Components	What needs to happen for the behaviour to occur?	Is there a need for change?	Determinant
Physical Capability	Being able to use the self-checkout	No	-
	Being able to pay for the groceries	Possibly, but cannot be controlled through behaviour change	
Psychological capability	Knowing how to use the self-checkout	No	-
Physical opportunity	Every item should be able to be scanned or selected easily	Yes, some items are difficult (for example ones that don't have a barcode)	
Social opportunity	Seeing that people around you / friends and family are scanning all items	Possibly, it is hardly visible if people scan all the items	Theory of Planned Behaviour: Seeing everyone scanning everything affects the perceived norm, leading to a higher intention to scan everything. Habit theory: environment restructuring that the 'habit' of stealing will be tackled (needs research if this happens)

	Seeing that people trying to steal get caught	Yes	
Reflective motivation	Believe that stealing is bad	Yes, unnormalize that stealing is okay. Raising children	
	Know stealing has consequences (increased prices by store)	Yes, most people don't think about this and only think about their individual and short-term consequences.	Theory of Planned Behaviour: People change their attitudes towards stealing based on the expected outcomes of it. Elaboration likelihood model: Giving strong arguments against stealing could make people think about it more and persuade them not to steal.
Automatic motivation	Have established routines for scanning the products properly	Perhaps, the routine can be connected to placing items in your cart/bag or moving from one to another. Negative automatic behaviour is also possible: being used to steal at the check-out	

After developing the target behaviour scenario, we used Michie's Capability-Opportunity-Motivation and the Behaviour model (COM-B) to define what needs to change and in which manner, before locating suitable behaviour change techniques (Michie et al., 2014). Specific behaviours that we attempt to modify are summarized in Table 2 in six types of determinants with answers to "What needs to happen for the behaviour to occur?" and "Is there a need for change?". It was decided to focus on Social Opportunity (i.e. seeing that people around you are scanning all items) and Reflective Motivation (i.e. knowing that stealing is bad and has consequences).

After that, we conducted background and user research to gain a better understanding of shoplifting behaviour and to validate our initial assumptions. Weel (2023) highlighted the following main reasons behind stealing at self-checkouts; the ease to steal, blaming it on inflation, and not stealing from an actual person. The background research indicated that people would not change their behaviour based on awareness of the consequences, however, all participants agreed that they probably would not steal if people could see the behaviour (Appendix, D). Therefore, we focussed on the visibility of the target behaviour through Social Opportunity.

After defining the need to change in terms of the COM-B model, we discussed what needs to be changed in the design to reach the target behaviour. Among the 11 categories of 'intervention functions' (Michie et al., 2014), we mapped our target with Environmental Restructuring – changing the physical or social context. Therefore, during the ideation phase, we primarily considered adding or removing objects in environment prompts/cues or restructuring the physical context, making it easier for people's behaviour at self-checkouts to be seen, making it more visible than in the current layout.

4. Theoretical Rationalization for Design Concept

Theory of planned behaviour

Our concept is made following the theory of planned behaviour (TPB), which assumes that the best predictor of behaviour is the intention people have about performing the behaviour. TPB considers attitudes, subjective norms, and perceived control as the main determinants of the intention to perform that behaviour (Montaño & Kasprzyk, 2008), see Figure 3.

The subjective norm is made up of normative beliefs, which are beliefs about whether others would approve of a certain behaviour, and the motivation to comply and meet the expectations others have about your behaviour (Montaño & Kasprzyk, 2008). Current self-checkouts are designed in a way that improves anonymity. Leung & Matanda (2013) discuss that individuals do not fear the judgments of others when they feel anonymous, decreasing the effects of normative beliefs. Our concept increases awareness of the scanning behaviour by connecting different self-checkouts into a circle. This could decrease anonymity and could therefore influence the normative beliefs people have about stealing behaviour.

This happens when people have high perceived control over their scanning actions. With perceived control, the amount of control people have about their behaviour is meant (Montaño & Kasprzyk, 2008). For our design case, looking at the control beliefs - a subdivision of perceived control - is of interest. Control beliefs are defined as the presence or absence of barriers to performing a behaviour based on the technology that is facilitated (Montaño & Kasprzyk, 2008). Current self-checkouts ensure a high control belief because with its layout shoplifting is hardly visible to others. Therefore, the re-design tries to increase visibility to lower the control beliefs about stealing.

Lastly, the re-design could affect the evaluation of behavioural outcomes. Attitudes are formed by the beliefs people have about a certain behaviour, and how the outcomes of that behaviour are evaluated (Montaño & Kasprzyk, 2008). Changing the evaluation of the outcomes of stealing with the re-design, by increasing explosion and visibility by others, could change the attitude people have about stealing at the self-checkout.

Mechanism of change

As mentioned, the determinants of change we focus on are normative beliefs, control beliefs, and evaluation behavioural outcomes, as seen in Figure 4. The Mechanism of change shows how environmental restructuring the self-checkout change these determinants, which will affect the behaviour outcome and eventually reach its eventual behavioural impact.



Figure 4: Mechanism of change based on Theory of Planned Behaviour

5. Ethics Analysis of Design Concept

The ethical aspects and consequences of the design case influence multiple stakeholders. The primary stakeholders are retailers, customers, and store employees, while the secondary stakeholders are law enforcement, competitors, and suppliers. In this section, the gains and losses related to the moral values of these stakeholders will be analyzed.

The *retailers* will have the major gain, which is increasing their profit, since the theft will be decreased, enhancing the customer's trust and loyalty. The losses, in this case, are minimal since the gains will outweigh them, but to implement the new self-checkout, the initial investment is needed, and support for the employees and customers to adapt to the new procedures. Retailers value honest and fair shopping, and the re-design promotes these values by reducing shoplifting and increasing financial honesty.

The *customers* might be rigid to change since they are used to the current shopping experience. The shoplifters will be impacted by the transition, feeling more watched by other customers and store employees. It might be hard for them to see any gains in the beginning since they will have to pay for everything, but eventually, the lowered prices due to reduced theft will be an important gain. The moral values of non-stealers will ideally have a positive influence on the stealers.

Multiple values are relevant for the customers, some of them are autonomy and privacy. Autonomy and privacy are crucial for customers, in our case this means allowing them to freely choose and scan their products without pressure or interference. Customers should have the assurance that their personal information and purchases are not widely exposed.

The effort of the *store employees* to catch the shoplifters will decrease, making their job easier. Since the re-design is based on existing self-checkouts, there will not be a lot of change in the responsibilities of the employees who monitor them. The security of the employees is essential and should be considered while designing an intervention, there shouldn't be a risk for the employees. Since the purpose of the re-design is to reduce theft behaviour, their security should increase.

Law Enforcement includes multiple stakeholders, such as the security of the store or police. The intervention will reduce their workload related to theft interventions and investigations, which will allow them to focus on other areas of law enforcement. These stakeholders appreciate the efficient use of resources and general lawfulness which are promoted in this case.

In the case of introducing the re-design as industry standard, the *competitors* will not be affected, so the overall security and convenience of self-checkouts will be improved. A competitive disadvantage might arise if some stores are unable to implement a similar design due to different factors.

On a long-term basis, the re-design offers more reliable and profitable relationships between the *retailers* and *suppliers* due to a potential increase in orders if the retailer benefits from reduced theft. Since both suppliers and retailers value fair trade, the re-design brings benefits to both.

A potential value tension might occur between the value of customer privacy and the transparency created by the re-design. Since the new self-checkout aims to make the scanning behaviour more transparent to reduce shoplifting, this could conflict with the customers' privacy and autonomy to buy the desired products. One might feel watched or ashamed to buy a certain product. This may affect both the non-stealers and the stealers, making them too aware of their shopping choices. In this case, an unintended ethical issue could arise, leading to discomfort for the customers, and potentially affecting the shopping experience and customer trust.

To minimize the risks of unintentionally restricting the autonomy of customers, a balance between transparency and privacy is needed. The environment shouldn't feel too monitored or restricted. The re-design should also consider the risks of other customer groups, not only the shoplifters, and understand the potential influence that it will have on honest buyers.

6. Evaluation Plan

To evaluate if the re-design delivers the intentional behavioural outcome, the following research question is asked: *Does the environmentally restructured self-checkout decrease the amount of shoplifting, based on scanning activity at the self-checkout?* To answer the research question four

goals are stated based on the mechanism of change, divided into intervention and interaction levels (see Figure 5).



Figure 5: Goals based on the mechanism of change for the theory of planned behaviour

Within the intervention level, the broader psychological factors that can influence behavioural change are examined (Miltenberger, 2008). Two goals are stated on the intervention level.

Measure the effect of the restructured self-checkout on normative beliefs, behavioural outcome evaluation, and control beliefs about stealing at the self-checkout. This goal tries to answer the effect of the re-design on the key determinants, evaluation of behavioural outcomes, normative beliefs, and control beliefs.

Measure the effect of the environmentally restructured self-checkout on the behavioural intent to steal at the self-checkout. This goal tries to see if the key determinant behavioural intent is changed by the re-design by focusing on the behavioural intent to steal at the self-checkout.

For the evaluation plan on the intervention level, an indirect assessment will be applied to evaluate if the key determinants are affected after implementing the new design in a real supermarket. Additionally, the contribution of the control beliefs, evaluation of behavioural outcome, and control beliefs on the intended behaviour change will also be evaluated. This will be done by using questionnaires before and after the implementation of the new design in real life. Participants will be gathered by random sampling of customers who have used the old and new designs.

Two goals stated in the interaction level could help determine the immediate observable effects of the re-design on behaviour and behavioural outcomes.

Measure the difference in behaviour between the restructured self-checkout and the original self-checkout. This goal helps determine the effect of the re-design on behaviour outcomes (i.e. if customers scan all items at the self-checkout or not.)

For evaluation purposes a real-world comparison study in which the behaviour with the original self-checkout will be analyzed and compared with the behaviour of the re-design. This direct assessment gives the possibility to analyze which behaviours have remained, which have changed, and if new behaviours are developed. This data provides the possibility for further iterations based on these newly established behaviours and including new behavioural change techniques when necessary.

Measure the effect of the restructured self-checkout on the amount of shoplifting at the self-checkout. This goal helps to determine if the intentional behavioural change is reached (i.e. if the amount of shoplifting at the self-checkout is changed).

For evaluating the last goal a direct assessment will be applied by using random check-ups to check if all items are scanned by customers. With this event-based observation, a period of one year will be applied to compare the number of stealing attempts of the old design with the new design. Supermarkets measure the attempts yearly, so this period will not add any extra work for supermarkets (Brisam, 2023).

Eventually, combining the results of the four goals will lead to a more comprehensive understanding of the behavioural impact and psychological underlying factors that the re-design may have caused. Giving the possibility to evaluate if the new design shows the intentional results.

7. Prototype and Empirical Evaluation

To develop the initial phase of knowledge in alignment with the previously described evaluation plan, an empirical evaluation approach was deployed with a sole focus on the previously stated first goal on an intervention level. This approach was set on creating a simulation based on the newly developed self-checkout concept. The aim was to investigate how the intervention function of environmental restructuring impacts the three key determinants: evaluation of behavioural outcomes (attitude), normative beliefs (subjective norm), and control beliefs (perceived control) of TPB. The examination of a potential change in these key determinants as well as evaluating the user experience of the prototype has been a central focus when constructing both the research protocol as well as implementing the chosen methods.

Research protocol

The empirical evaluation prototype was built as a full-scale mock-up of the rendered re-design (Figure 2). The identical model, with its replicated functions, would allow for the reenactment of two different roleplays, in which both the actions and behaviours of participants could be closely evaluated.

The mock-up's foundation consists of a circular table, on which four individual but identical wooden blocks are positioned, serving as designated spots for customers to approach (Figure 6). The wooden blocks replicated the scanning and paying area of a self-checkout. Therefore, a paper prototype touchscreen (payment area) and a customer bell (recreating the scanning sound) were incorporated. Furthermore, to replicate the displacement from an openly visible shopping cart to a closed-off personal bag, the mock-up allowed for positioning the groceries openly on the right side of the wooden blocks, while the closed-off personal bag was situated on the left.

As mentioned before, the research protocol consisted of two roleplays. For the first roleplay, participants were solely asked to perform an assignment that was handed to them on a card without any additional explanation (Figure 7). During each roleplay, one participant received a "Stealer" card while the remainder of the participants received a "Customer" card. During the second roleplay, the same cards were given, but an additional element was introduced: all the "Customers" should actively identify the participant who assumed the role of the "Stealer". While the participants had to identify the "Stealer", the researchers were aware of the roles of the participants, to better understand and observe their behaviours. The complete empirical evaluation consisted of three groups with participant counts of three, three, and four. A detailed overview of the research protocol in which a total of 10 participants have engaged can be found in Appendix B.

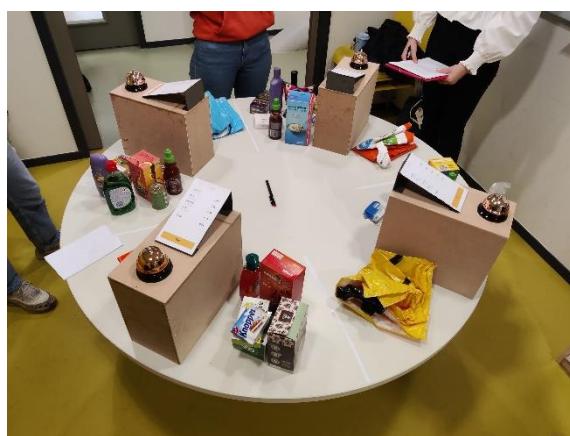


Figure 6: Empirical evaluation prototype

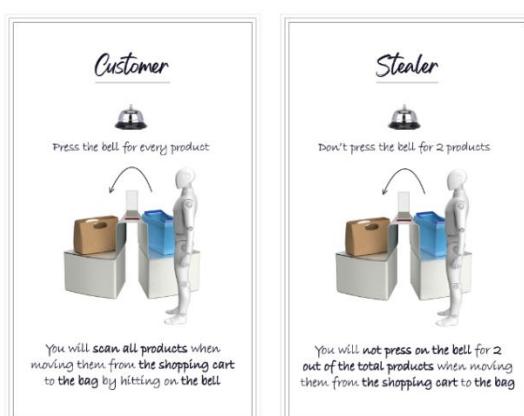


Figure 7: Assignment cards

Methods & results of the empirical evaluation

The empirical evaluation research probe explored key determinants of planned behaviour through open-ended focus group questions (for both roleplays), an online questionnaire at the end of the experiment, and observation schemes, focused on "Stealers" and "Non-stealers". The integration of diverse data sources aimed to strengthen the credibility of the findings, considering all physical elements of the final design concept.

Focus groups

After the first roleplay, in which participants were asked to solely execute the task of either "Stealer" or "Customer" on their assignment card, two questions were asked to the group: "*Did anyone notice the stealer of this group that did not scan all items before placing it in their bag, and was thus stealing at the self-checkout?*" and "*Can the person who had the assignment to steal raise their hand and evaluate on your experience of stealing during this process?*" (Appendix C). The first question involves obtaining quantitative data for the prototype's functionality, understanding individuals' awareness and concern about stealing behaviour and evaluating potential subjective norm shifts. Out of the 7 participants who were assigned "Customers" during the first roleplay, 0 participants noticed that the "Stealer" didn't scan all items by ringing the bell.

The second question focuses solely on the stealer of the group, gathering qualitative data to understand their attitudes, control perception, and subjective norms regarding self-checkout stealing. Upon evaluating the results, it was revealed that out of the 3 "Stealers" during the first roleplay, one participant mentioned that they felt uncomfortable because everyone was very close (Group 1, [P1]), and another participant mentioned that they were afraid of other participants watching: "*It's circular so you're afraid that someone is going to watch you*" (Group 3, [P2]). Furthermore, every "Stealer" stole the two smallest items out of their selection of supermarket products, connecting to their potential control beliefs. One participant mentioned that they wanted to steal something bigger, but a smaller item would be less noticeable: "*I probably wanted to steal something bigger, but this was easier*" (Group 2, [P2]). During the second roleplay, participants were asked again to perform the assignment that was written on the card, but now trying to actively seek out who the "Stealer" is. This roleplay was implemented in the empirical evaluation to provide insights for inserting a potential new intervention function. The focus group questions after Roleplay 2 were the same as for Roleplay 1. Out of the 7 participants who were assigned "Customers" during the second roleplay, 4 participants could confidently point to the "Stealer", while one participant wasn't sure but noticed that the "Stealer" in the group was done earlier than the rest. Moreover, one "Customer" participant enlightened us with the observation of the "Stealer" noticeability being stressed during roleplay 2 in the stealing process: "*I did notice a difference this time, that you as the stealer were doing everything really fast, which you don't normally do. I saw that you were stressing because you know other people are actively looking*" (Group 1 [P1]), and another "Stealer" participant mentioned that they felt more nervous: "*I was more nervous than the round before*" (Group 3 [P4]).

Furthermore, stealers in general mentioned that they had to strongly focus on their strategies when they were trying to steal, resulting in one participant forgetting to steal a second item until the last moment (Group 2 [P3]), and one participant forgetting to place their items in their bag after ringing the bell (Group 1 [P2]).

Comparing the quantitative results of Roleplay 1 to Roleplay 2 suggests that the functionality of the design concept was more effective during Roleplay 2. This may indicate that providing participants with the knowledge of why this environmental restructuring was in place, specifically the suggestion of potential theft, could make a difference in influencing behaviour. Furthermore, the qualitative results of the second question suggest that when people are asked to actively observe each other's actions during the scanning process, the "Stealer" experiences an increase in feelings of stress and nervousness due to the presence of an actively perceived subjective norm.

Online survey questionnaire

The questions that were asked during the online survey questionnaire focused on the differences in the subjective norm, perceived control, and attitude between the current self-checkouts at supermarkets, and the re-designed self-checkout (Appendix D). While answering these questions, images of the final renders were taped to the wall as a reference for how the finalized concept would look (Figure 2).

In relation to the subjective norm, 7 out of 10 participants initially felt a subjective norm '*not to steal at the self-checkout*' before their involvement in this research. This norm temporarily shifted to 6 out of 10 participants during the first roleplay and subsequently reverted to 7 out of 10 participants during the second roleplay. Although it seems that there hasn't been a drastic shift in the subjective norm from these numbers, the qualitative elaboration on the subjective norm during the roleplays did suggest a difference; during roleplay 1 participants did feel the number of eyes that were possibly looking at them, and this only increased during the second roleplay, which resulted in participants

feeling the intent of performing correct behaviour: "*there are so many eyes on you (in first instance especially the researchers of this test), so I felt the need to do what I was supposed to do*". One "Stealer" participant even mentioned that due to other participants having the opportunity to see their actions they felt that their stealing behaviour was unacceptable during roleplay 2: "*By having to actively steal I felt the pressure of the other two participants watching me which made it feel unacceptable in social standards*".

Secondly, the control beliefs of participants were examined by questioning their opinions of a possible barrier being present within the design concept. Important to mention, is that there were no environmental constraints present for scanning or not scanning the items. However, 9 out of 10 participants answered that they did believe the design concept would act as a barrier during potential theft, due to the transparency of the construction. Answering their cognitive ability for perceived control, conversely, resulted in 4 out of the 10 participants feeling the same amount of control, 3 out of the 10 participants feeling an increase in control, and the remaining 3 participants feeling a decrease in control.

Lastly, the questions regarding the control beliefs of the "Stealers" during the scanning process revealed that 4 out of the 6 "Stealer" participants had thought about possible negative consequences and would think that a potential stealer in reality would do so as well. The qualitative elaboration on these evaluations of behavioural outcomes was very diverse, but this would suggest that a shift in attitude is possible when it comes to implementing the intervention function of environmental restructuring in this manner.

Observation scheme

To evaluate the physical behaviour of participants during the roleplays and justify the qualitative data gathered from the focus group questions, an observation scheme divided into "Not-stealers" and "Stealers" was used. During the roleplays, the observation schemes were split among the research team, resulting in every team member being able to focus on one aspect of the behaviour. A detailed overview of the complete observation schemes can be found in Appendix E.

Regarding the "Not-stealers" during the roleplay, i.e. the participants who received a "Customer" assignment card, possible observations regarding the noticeability of the subjective norm stood central, such as "*Do people interact with each other in general while performing their tasks?*" and "*Do people non-verbal respond to the stealer not scanning all items?*". After analyzing the results, it was revealed that there was no verbal interaction between participants during the scanning of their products at the self-checkout both during roleplay 1 and roleplay 2. However, a difference in non-verbal communication was observed during the first roleplay and the second roleplay. During roleplay 1, almost no one looked up from their area of the self-checkout, while during roleplay 2, it was commonly observed that participants did give side-eyes or looked up at the environment. Moreover, when participants did look at other participants' actions, there was a difference noted between some participants randomly looking up, and some participants looking up in a structured manner, such as after the scanning of each product.

Regarding the "Stealers" during the roleplay, i.e. the participants who received a "Stealer" assignment card, the behaviour secondary to the information of them being a stealer stood central, such as "*Does the stealer use strategies for being unnoticed while stealing?*" and "*How does the stealer respond to (not) being caught verbally?*". After analyzing the findings, the research team observed that the "Stealer" often appeared stressed or nervous. This was observed in instances where the stealer forgot to pack their bag or neglected to steal a second item. Generally, the stealers also took longer to complete the task, suggesting that a significant cognitive load was involved in managing all aspects of the stealing process. During the focus group questions, this was later confirmed with qualitative data (Appendix C). The strategy of transporting two items while ringing the bell once was the most frequent tactic of theft.

8. Discussion

As far as we can tell, previous research has not explored altering the physical layout of self-checkouts to reduce theft yet. In fact, no scientific reason was found for the current layout, facing customers against a wall, makes item scanning difficult, making shoplifting less visible and easier to perform.

This made the layout an interesting aspect of the self-checkout to look into, especially when it comes to reducing shoplifting.

During the process, there were some difficulties regarding the formulation of our desired behaviour in behavioural terms, as it was difficult to differentiate between our desired behaviour and the behaviour we wanted to prevent. Our desired behaviour of "scanning all items before paying and exiting the store" is effectively the same as "not stealing at the self-checkout", although there are multiple ways to steal which makes the behaviour of "scanning everything" more specific. Despite this slight confusion at first, we had some effective brainstorming sessions and were able to follow the behaviour change wheel framework closely.

Our concept has the potential to decrease shoplifting at self-checkouts by focusing solely on customers who decide to steal items without scanning one or multiple items. This approach does not apply to shoplifters sneaking items into their pockets or walking out without using the checkout, as it would be too complex for the time available for this course.

While our concept did show potential during the empirical evaluation, more testing is needed before implementing this concept in actual stores. Something we were not able to do in the limited time, was directly comparing the new layout against the existing layout. Therefore, the next step would be to perform a similar evaluation but to create both the circular layout as well as recreating the regular layout and test them both. This allows them to be directly compared to each other, leading to more insights about the differences between both layouts.

9. Conclusion

The study aims to decrease shoplifting at the self-checkout of supermarkets, by presenting an iterated re-design. The following behaviour is targeted: When using the self-checkout at supermarkets, customers will scan all their items before paying and exiting the store. The empirical evaluation prototype tries to create a shift in the key determinants of normative beliefs, control beliefs, and evaluation of behavioural outcomes, based on the Theory of Planned Behaviour, and makes use of the theory of COM-B to establish a suitable intervention function. The goal of the re-design is to create awareness and visibility of the scanning behaviour with the use of the intervention method Social Opportunity, by Environmentally Restructuring the physical context. Furthermore, an empirical evaluation that is based on the re-design has been conducted, showing a promising shift in behavioural intention when it comes to all three evaluated key determinants. This indicates the potential in changing the target behaviour, by increasing the pressure of being watched and decreasing the ease of stealing due to visibility.

10. References

- Brisam, F. (2023, March 3). *Supermarkten gaan met nieuwe technologie strijd aan tegen diefstal*. RTL Nieuws. <https://www.rtlnieuws.nl/nieuws/nederland/artikel/5369430/zelfscankassa-supermarkten-diefstal-techniek-innovatie-beveiliging>
- Cosslett, R. L. (2014, January 30). The machines have turned Britain into a nation of shoplifters. *The Guardian*. <https://www.theguardian.com/commentisfree/2014/jan/30/nation-of-shoplifters-supermarket-self-checkouts>
- Leung, L. S. K., & Matanda, M. J. (2013). The impact of basic human needs on the use of retailing self-service technologies: A study of self-determination theory. *Journal of Retailing and Consumer Services*, 20(6), 549–559. <https://doi.org/10.1016/j.jretconser.2013.06.003>
- Michie, S., Atkins, L., & West, R. (2014). *The Behaviour Change Wheel: A Guide To Designing Interventions*. Silverback Publishing. <https://www.behaviourchangewheel.com/>
- Michie, S., van Stralen, M. M., & West, R. (2011). The behaviour change wheel: A new method for characterising and designing behaviour change interventions. *Implementation Science*, 6(1), 42. <https://doi.org/10.1186/1748-5908-6-42>
- Miltenberger, R. G. (2008). Behavior modification. In *Handbook of clinical psychology, vol 2: Children and adolescents* (pp. 626–652). John Wiley & Sons, Inc.
- Montaño, D. E., & Kasprzyk, D. (2008). Theory of Reasoned Action, Theory of Planned Behavior, and the Integrated Behavioral Model. In *Health Behavior and Health Education: Theory, Research, and Practice* (4th ed., pp. 67–92). https://www.researchgate.net/publication/288927435_Health_Behavior_and_Health_Education_Theory_Research_and_Practice
- Nesselaar, S. (2022, December 28). *Diefstal bij de zelfscankassa populair: 'Het is gewoon heel makkelijk'*. NH Nieuws. <https://www.nhnieuws.nl/nieuws/312703/diefstal-bij-de-zelfscankassa-populair-het-is-gewoon-heel-makkelijk>
- Weel, D. (2023, April 26). The Students Using Self Check-Out to Rob Supermarkets. Vice. <https://www.vice.com/en/article/5d38yq/students-using-self-checkout-to-shoplift-hundreds-of-dollars>

Appendices

A. Individual Contributions

Table 3: Individual contributions

Section	Person
Report: 1. Introduction	Rosanna Henstra
Report: 2. Design process and concept description	Liu Haoyu
Report: 3. Implementation design rationale	Liu Haoyu
Report: 4. Theoretical rationalization for design concept	Jochem Verstegen + Rosanna Henstra
Report: 5. Ethics analysis of design concept	Ioana-Maria Caramiciu
Report: 6. Evaluation Plan	Rosanna Henstra
Report: 7. Prototype and empirical evaluation	Susan Draaijer
Report: 8. Discussion	Jochem Verstegen
Report: 9. Conclusion	Liu Haoyu + Rosanna Henstra
Report: Citations and references	Jochem Verstegen
Report: Layout and final checks	Ioana-Maria Caramiciu + Rosanna Henstra
Building the prototype	Jochem Verstegen + Liu Haoyu
ERB and Consent form	Ioana-Maria Caramiciu
Empirical Evaluation – planning and research protocol	Susan Draaijer + Rosanna Henstra
Survey Empirical Evaluation	Susan Draaijer + Ioana-Maria Caramiciu
3D model prototype	Liu Haoyu
Survey Background research	Jochem Verstegen

All team members contributed equally throughout the entirety of the project, often dividing different parts individually or in teams. During the weekly group meetings, the work of team members could subsequently be discussed in detail, in which a next division of tasks could be made. At the beginning of the course, all team members were engaged in exploring and understanding the material of the lectures, resulting in every team member passing the theory midterm-test and being actively involved during the COM-B analysis workshop.

Before starting the ideation phase, a survey had been crafted in Microsoft Forms in order to gain background research of o.a. the current subjective norm of theft at supermarkets. The survey consisted of 17 questions which were all generated during an online group meeting. Afterward, Jochem Verstegen was in charge of developing a coherent survey in the Microsoft Forms application.

During the ideation phase of the final design concept, every team member individually created ideas through the means of sketching, which was repeated in a second iterated sketching session after the feedback of the presentation. Both presentation formats were constructed by all team members and were presented by Rosanna Henstra, Liu Haoyu, and Jochem Verstegen during the first presentation. The second presentation was presented by Rosanna Henstra, Liu Haoyu, Jochem Verstegen, and Susan Draaijer. During the meeting which concluded the ideation phase of the project, all team members discussed the generated ideas about possible intervention functions and evaluation possibilities, which resulted in an agreement on the final design concept. Liu Haoyu afterward created high-quality renders of multiple 3D models.

In the preparation phase for the empirical evaluation, Rosanna Henstra and Susan Draaijer constructed the means of the evaluation plan, as well as the empirical evaluation. The creation of the wooden blocks and the paper payment area of the prototype was built by Jochem Verstegen and Liu Haoyu. The research protocol as well as the "Customer" and "Stealer" assignment cards were created by Susan Draaijer, while Rosanna Henstra was in charge of the observation schemes. Furthermore, Ioana-Maria Caramiciu completed the ERB-form in its entirety to ethically perform the research and also drafted the informed consent forms. The online Microsoft survey questions utilized during the empirical evaluation had been a team effort between Susan Draaijer and Ioana-Maria Caramiciu, where Susan Draaijer created the focus group questions destined for after the two roleplays, and Ioana-Maria Caramiciu developed the questions related to informed consent. On 26/10/2023 the empirical evaluation had been performed with all the team members present. During the empirical evaluation, Susan Draaijer explained the research protocol to participants and also transcribed the data afterward that was gathered from this day.

The paper was written as a team, with different team members focussing on different parts, while often meeting and commenting on each other's work (Table 3). The introduction and Evaluation plan were written by Rosanna Henstra. The Design process concept description and Implementation of the design rationale were written by Liu Haoyu. The Prototype and empirical evaluation section was written by Susan Draaijer, the Ethics analysis of the design concept was written by Ioana-Maria Caramiciu, and the discussion was written by Jochem Verstegen. Furthermore, a team effort in the section Theoretical rationalization for design concept was written by Rosanna Henstra and Jochem Verstegen, which is also the case for the Conclusion of the report written by Rosanna Henstra and Liu Haoyu. The layout of the report as well as the final checks were done by Ioana-Maria Caramiciu and Rosanna Henstra, while Jochem Verstegen oversaw finalizing the citations and reference list.

B. Research protocol

Empirical evaluation Scheme 26/10/2023

*Before starting, ask participants to scan the QR-code and **fill in the first part of the survey about consent***

STEP 1. Thank everyone for participating, and explain the plan of today;

Welcome everyone, thank you all for participating, today we are going to evaluate this new concept of self-checkouts at supermarkets. In this test, we are going to do 2 roleplays of the scanning (and paying) process at the self-checkout, where you will gain the role of customers, and afterwards we have a short questionnaire for you which you can fill out here on your phone (using this QR code / link)

STEP 2. Explain 'The game'

Here in front of you, you see a new construct of the self-checkout with 4 check-outs in one table, where you would place the supermarket shopping cart to the right of you, and your personal bag to the left (which you can see here in the render). The idea is that you will transfer your items from your shopping cart to your bag, and while doing this you will scan this item. In this test, the bell in the middle functions as the scanner. So the beep you hear when you would normally scan an item is now re-enacted with this bell.

So when we start, you will come through this door, you will start scanning your items and after you are done, you will pay for your groceries by just holding your phone to this area. Afterwards you can just walk out, and leave the groceries to the left side of the table. - **Is everything clear so far? -**

Before we start, you will get a card which explains an assignment of what you need to do during the role-play



STEP 3. Enact roleplay 1 (Observation scheme)

- Observe if people respond to the stealer not scanning all items

- Observe if there is verbal communication about stealing
- Observe if people are looking and noticing each-others actions

STEP 4. Ask focus group questions (semi-structured):

Question 1:

Did anyone notice that one person of this group did not scan all items before placing it in their bag, and was thus stealing at the self-checkout?

-allow for discussion-

Question 2:

Can the person who had the assignment to steal raise their hand and evaluate on your experience of stealing during this process?

-allow for discussion-

STEP 5. Roleplay 2

Now we are going to do this roleplay again, but you all know now that one/or more person(s) has the assignment to steal, and ask people to actively identify this person.

- Observe if people respond to the stealer not scanning all items
- Observe if there is verbal communication about stealing
- Observe if people are looking and noticing each-others actions

STEP 6. Ask focus group questions (semi-structured):

Question 1:

Did anyone notice the stealer of this group that did not scan all items before placing it in their bag, and was thus stealing at the self-checkout?

-allow for discussion-

Question 2:

Can the person who had the assignment to steal raise their hand and evaluate on your experience of stealing during this process?

-allow for discussion-

STEP 7. Thank everyone for participating, and ask them to fill in the online survey→

Survey

Environmental restructuring
of the self-checkouts at
supermarkets



C. Transcriptions Focus Group Questions

Empirical evaluation Group 1

FIRST ROLEPLAY - Focus group questions

[P1]= stealer [P2]= Non-stealer [P3]= Non-stealer

Due to technical problems this audio could not be transcribed

Question 1:

Did anyone notice the stealer of this group that did not scan all items before placing it in their bag, and was thus stealing at the self-checkout?

→ The non-stealers didn't notice that someone else was stealing, but they figured that someone would have gotten some type of assignment in that direction (with the assignment cards).

Question 2:

Can the person who had the assignment to steal raise their hand and evaluate on your experience of stealing during this process?

→ The stealer felt very uncomfortable, as she felt everyone was very close. She stole the gum and one knoppers cookie, and her tactic was to grab two products at the same time, but only ringing the bell once.

SECOND ROLEPLAY - Focus group questions

[P1]= Non-stealer [P2]= Stealer [P3]= Non-stealer

[P1] "I noticed nobody scanned the bags"

[P2] "Okay, but they are all different bags so I imagined they were all brought from home"

Question 1:

Did anyone notice the stealer of this group that did not scan all items before placing it in their bag, and was thus stealing at the self-checkout?

[P1] [P3] Yeah, Yeah

[P3] Yeah I saw that P2 sneaked something around the self-checkout block (laughter)

Question 2:

Can the person who had the assignment to steal raise their hand and evaluate on your experience of stealing during this process?

[P2] Yeah I had the exact same issue as that you had [P1], that the first product is easy. When I walked in, I just immediately grabbed the gum, you're gone (laughter). And then it was like how am I going to the second one, cause everybody notices it when you take two at the same time then it is so obvious. Then I thought about this (points to rise grocery product), but this makes way too much sound.

[Ima] You got the conditioner?

[P2] I did steal the conditioner yes, (laughter)

[P1] I did notice a difference this time, that you as the stealer were doing everything really fast, which you don't normally do. I saw that you were stressing, cause you know other people are actively looking.

[Susan] What did you think about having to move the products over the counter for scanning and placing them in the bag in the other area?

[P1] It helps

[P3] Can't you do that at the supermarket right now?

[P1] Or that you put it over but it doesn't scan it immediately

[P2] It's also how it is designed at some places, cause in very big Lidl's they have self-scans and it is really designed that you put your basket on one side and the bag on the other. You pull it from one side to the other. And you have also in bigger cities like in France, where they weigh the groceries. You have to put it down in a way that it scans it, and it also scans your bag on the other side. So if the weight is different before and after then you will get a check.

[P3] I did notice that while I was looking whether the other people were stealing, that I was like, oh my god maybe now I forget something to scan.

[P2] I also did think at some point, did we all get a stealing card? (laughter) So I was like doing my own thing but also paying attention if someone else was stealing

[P3] I do have to say that I never notice anyone stealing when I go to the Jumbo.

[P1] If I do, I wouldn't say it. That's the thing.

[P3] Do you pay attention? Looking around?

[P1] Well, not necessarily but I live at X, so people steal a lot there. And it's maybe stupid but it is not my problem. And I just don't feel like telling about it to someone else, or getting them arrested.

[P2] For me it's a difference, If it would be one of those Turkish supermarkets, the local ones, or the Toko's, those places I would never steal from because it has a much larger impact.

[P1] Indeed, it is more personal

[P2] If someone steals at a big store.. Like, they are inflating our prices unfairly, so just get your own stuff.

[P3] I know one person who never pays for her bread at the self-scan. She would get in and already put it there, she is like you are stealing from me so I'm stealing from you.

[P1] Yeah, people who steal will tell themselves that it is okay to steal. Or tell themselves it is fair. I think people don't even realize that it is their problem, or how it can negatively affect something that they care about.

[P2] I have quite a few friends that when we go to a protest or something somewhere else in the Netherlands and we go to Eindhoven station, basically half of them are like, okay Albert-heijn to go time, you don't even have to print a label to walk out the store, and say "this is my free lunch for today". You walk in with a group, some people pay for their stuff and some people just walk out, and go on. But they never do that at places where they would directly impact another individual.

[P3] I also do need to say that I could very easily with a side-eye see what my neighbor was doing (laughter). Cause you're actually very close to each other. I don't know if these are the exact dimensions you would be using, but in this case, you can also see what other people are buying, which can be slightly awkward.

[P2] I think it would be easier to steal here (new checkouts) if you were with two people. If you're doing groceries together, one person could block the vision from one side, and start scanning, and the other person could join later with some other stuff and place some items in the already scanned bag when it hasn't been scanned at all. and you're done. If it's only

single people, I think it is very hard to steal, if you go with two people I think there are some tactics you can apply

[Jochem] I realized that you were not packing your bag

[P2] Yeah indeed, I only realized that half-way through, like oh no I should put it in my bag. I was too focused on the stealing that I completely forgot. Like I said, the first gum was pretty easy but after that it became difficult. The first roleplay it was pretty easy, but the second roleplay I really had to think. I was also confident the first time with ordering items to scan, like the hard stuff should be at the bottom, and the pears on top otherwise you will get crushed pears, and the second time that completely got out of the window.

[P1] I actually did realize the gum, because you rang the bell once, and I saw two items and it was not in the bag. So the bag actually helps you to disguise what you stole. I think that the sound was the most obvious. But in the supermarkets, there are a lot of sounds. But placing it immediately in the bag actually helps you with disguising what you actually stole.

[P2] Also, when I do groceries for like a week, I go to the Lidl for the big stuff, and then I buy some specialty items at the Albert Heijn, and then you have already a bag when you go into the second store. Even before approaching the table, you would then automatically have some stuff already in there. Especially at the check-out now, I don't think anybody even notices it. Only at the checkup, they would have to go through your entire bag.

[Susan] Okay great, thank you guys for your insights, you can fill in the next part of the survey, and if you have any questions please ask

After survey questions

[P1] I do think there is a layer of people actually wanting to steal, and there is a layer of people stealing because it is just too easy, and who will say "oh I forgot to scan". But those sorts of people, I think you filter them out.

[P2] But people who need to do it will get hit harder by it being less easy, but that's a different issue.

[Susan] We were also trying to test this indeed, because we found that people have found such creative ways to steal at the self-checkout, we were interested if you would apply new creative ways here, or that some of them are reduced or is it the same. Like you said with two people you could make something up to steal better than with one.

[P2] Yeah, I also want to say that the more classic ways of stealing would come back into fashion, you know I did it back in the day. You can wear something oversized, you can put it in your sleeve, an extra purse. Because also the people that walk around there are working for a super minimum wage. Even if they see you for a split second, they are like, am I really going to call this in?

[P1] Maybe it's nice to think about the groups of people who steal, because there are different sorts and kinds of stealers. You're not going to get the people who planned to steal, they are going to do it anyway. Mostly in the store, if there is a check-out like this they will do it there. But there are a lot of people who steal because they know they just get away with it, and because it is easy. If it is just one item, they can just get away with it.

[Rosanna] Yeah that is also our target group. For now, for example, a lot of students are stealing, and based on that, if it is really easy to steal they will do it eventually.

[P1] I do think that a lot of students actually steal because they think that we are a part of "de pech-generatie". Students who say "oh, this is done to us" so we are allowed to. And I think that's the problem. And also, who has the responsibility to turn them in? Because no other

student is going to turn a student in. We're all in the same boat.

Additional insights after empirical evaluation from [P2]

"It's way more difficult to steal when you have to use two hands. Due to needing to press on the bell while you are moving the product over neath it with the other hand, it's way more difficult, as you have to scan with the one hand, and steal with the other"

Empirical evaluation Group 2

FIRST ROLEPLAY - Focus group questions

[P1]= Non-stealer [P2]= Stealer [P3]= Non-stealer

Question 1:

Did anyone notice the stealer of this group that did not scan all items before placing it in their bag, and was thus stealing at the self-checkout?

[P1] [P3] No I didn't, No me neither

Question 2:

Can the person who had the assignment to steal raise their hand and evaluate on your experience of stealing during this process?

[P2] Well yeah, I was just trying to get this bar, and quickly throwing another item in the bag. I was more focused, I think any of them would focus on me because they were too busy scanning their own items

[Susan] Okay, did you have a tactic as well? How did you steal, what did you steal?

[P2] I stole these 2 (gum, and koppers cookie). I probably wanted to steal something bigger, but this was easier.

SECOND ROLEPLAY - Focus group questions

[P1]= Non-stealer [P2]= Non-stealer [P3]= Stealer

Question 1:

Did anyone notice the stealer of this group that did not scan all items before placing it in their bag, and was thus stealing at the self-checkout?

[P1] I didn't really notice, but I just figured [P3] was done earlier.

[P2] I couldn't really notice, I still was too focused on my own scanning.

Question 2:

Can the person who had the assignment to steal raise their hand and evaluate on your experience of stealing during this process?

[P3] Well, I tried to take two things at once, without the upper one in my hand being seen. Then I forgot I had to steal something (laughter), and therefore the second time I just had to put it in the bag without ringing the bell. But I felt that was like really obvious because that

was a bigger product.

[Susan] What did you think about the setup of the new check-outs in this way?

[P3] For myself, I thought I was more exposed because I had to bring it all the way to the other side without ringing the bell, and I thought they would notice, but they didn't.

Empirical evaluation Group 3

FIRST ROLEPLAY - Focus group questions

[P1]= Non-stealer [P2]= Stealer [P3]= Non-stealer [P4] Non-stealer

Question 1:

Did anyone notice the stealer of this group that did not scan all items before placing it in their bag, and was thus stealing at the self-checkout?

[P2] [P3] [P4] No I didn't

Question 2:

Can the person who had the assignment to steal raise their hand and evaluate on your experience of stealing during this process?

[P2] It was weird, I don't know, it didn't feel right. Because like this, it's circular so you're afraid that someone is going to watch you. I think this way is worse than the normal check-outs that we have because usually everyone is focused on their own, but here you can easily see the products that other people are scanning. And I also couldn't figure out if someone noticed that I was not scanning all the products.

[P4] I didn't

[Rosanna] Did you also have tactics for it? for the stealing?

[Ima] What did you do? what did you steal?

[P2] I stole this (gum), and I didn't want to leave it for the end, cause I didn't want other people to notice. So I tried stealing the small stuff, and not all in the end. So I would (rings the bell) while moving products, rather than noticeably not ringing the bell at the last product.

[Rosanna] Was it on purpose that you placed your bag also on the same side?

[P2] Yes, because then there will be not a lot of distance between the two bags

SECOND ROLEPLAY - Focus group questions

[P1]= Non-stealer [P2]= Non-stealer [P3]= Non-stealer [P4]=Stealer

Question 1:

Did anyone notice the stealer of this group that did not scan all items before placing it in their bag, and was thus stealing at the self-checkout?

[P1] [P3] Point to the stealer

[Susan] And you, did you also notice that [P4] was the stealer?

[P2] Nods no, I only focussed on my own spot

Question 2:

Can the person who had the assignment to steal raise their hand and evaluate on your experience of stealing during this process?

[P4] I was more nervous than the round before. I was more thinking about okay how am I going to steal two things, without people noticing, although they are aware that someone is going to steal.

[Susan] What did you steal? How did you steal?

[P4] I stole the gum, and the knoppers. And I did it with two products at the same time.

[Susan] Did you saw that as well, [P1][P3], that she was stealing like that?

[P1][P3] Yeah, Yes

[P1] I saw that she took two products, but scanned only once

[P3] Same

[Rosanna] Do you have other comments, when comparing this experience to the current self-checkouts?

[P4] Yeah it's very noticeable that you are all together instead of sideways doing your own thing. Also because we did it twice, the second time I thought I knew them better also, like the first time it isn't as personal as the second time, as I was a stealer in the second round.

[P1] I think it's also different because you have the goal in your mind of stealing which makes you nervous, it puts a pressure on you. Because it also happens now at the checkout that you forget to scan products but that doesn't make you as nervous, that would be an accident. Like, you have to steal two products, not 3 not 4, but 2 (laughter)

D. Online survey questionnaire

01-11-2023 20:58

Environmental restructuring of the self-checkouts of supermarkets

Environmental restructuring of the self-checkouts of supermarkets

10
Antwoorden

24:59

Gemiddelde tijd om te voltooien

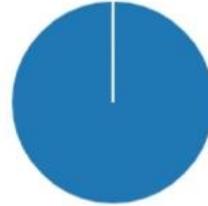
Actief

Status

-
- I read the description and I **agree** with the terms of the study

Yes
No

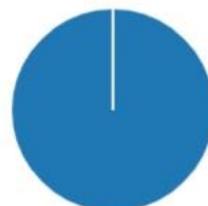
10
0



- I am **sufficiently informed** about the research project through a separate information sheet. I have read the information sheet and have had the opportunity to ask questions. These questions have been answered satisfactorily.

Yes
No

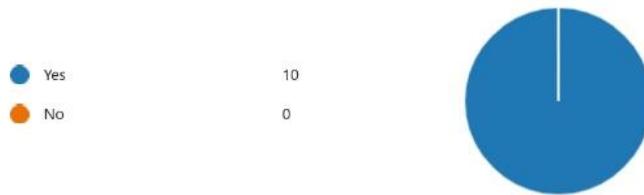
10
0



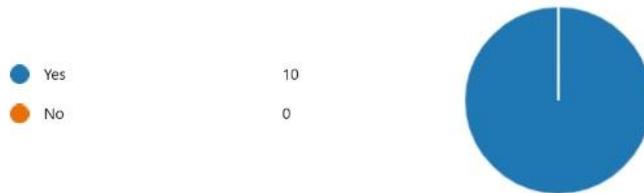
Environmental restructuring of the self-checkouts of supermarkets

10
Antwoorden
24:59
Gemiddelde tijd om te voltooien
Actief
Status

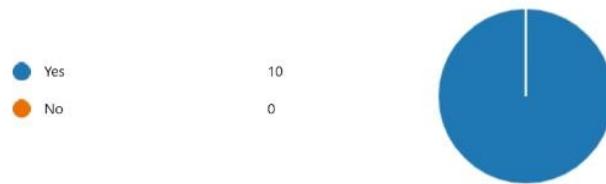
-
1. I read the description and **I agree** with the terms of the study



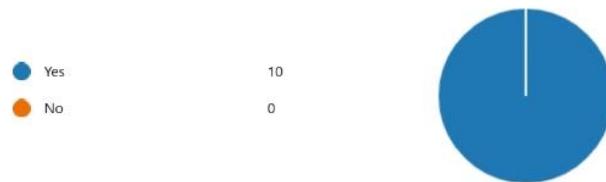
-
2. I am **sufficiently informed** about the research project through a separate information sheet. I have read the information sheet and have had the opportunity to ask questions. These questions have been answered satisfactorily.



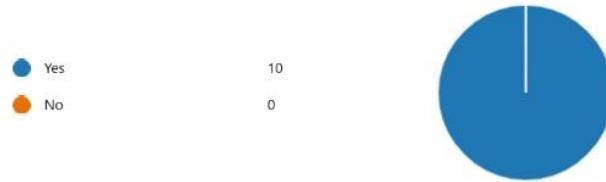
3. I take part in this research project **voluntarily**. There is no explicit or implicit pressure for me to take part in this research project. It is clear to me that I can end participation in this research project at any moment, without giving any reason. I do not have to answer a question if I do not wish to do so.



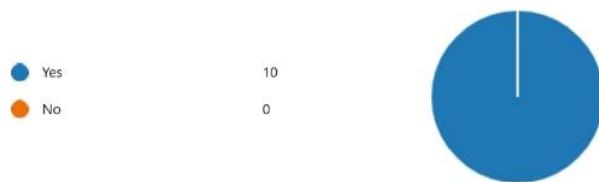
4. I consent to **processing my personal data (anonymously)** gathered during the research in the way described in the information sheet.



5. I consent to making **(sound/image) recordings** during the interview and to processing my answers into a transcript.



6. I consent to using my answers for **quotes** in the research publications – **without my name being published** in these.



7. I consent to **the research data being stored** during the duration of the study, and using this data for future research in the field of behavioral change in which recognized ethical standards for scientific research are respected, as well as for education purposes.



8. Do you agree to continue the study?



9. Which focus group did you join?

- Focus group 1: 10:00-10:30 3
- Focus group 2: 13:30-14:00 4
- Andere 3



10. What is your age?

10
Antwoorden

Meest recente antwoorden

"23"
"21"
"24"

3 respondenten (30%) antwoordden 23 op deze vraag.

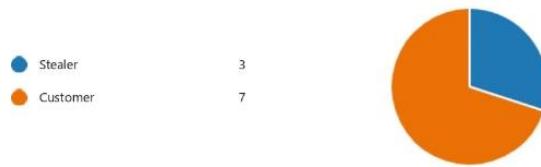
21 23²² 19
18

11. During **roleplay 1** of the research, I took the role as:

- Stealer 3
- Customer 7



12. During **roleplay 2** of the research, I took the role as:



13. *Before participating in this research*, which statement would describe your perspective on the subjective norm (= a shared standard of acceptable behavior by society) of theft at the self-checkout the best?

- Before participating, I felt a subj... 1
- Before participating, I felt a subj... 7
- Before participating, I didn't feel... 2
- Andere 0



14. Please elaborate on *why* you chose this answer

Meest recente antwoorden
10
 Antwoorden
"I just feel like I need to be honest and I don't need to steal."
"I chose that answer because I believe that stealing for whate..."
"I do not have any experience about it"

1 respondenten (10%) antwoordden **think it's morally** op deze vraag.

big corporations ethically speaking bit of a v
labour theftprices in the supermarket negative thing high
record profits think it's morally supermarket br
mentally its seen price increasesproduct prices mone
punishment subjective norm no money goes just accid

15. During the first roleplay in this research, which statement would describe your perspective on the subjective norm (= a shared standard of acceptable behavior by society) of theft at the self-checkout the best?

- During the first roleplay, I felt a ... 3
- During the first roleplay, I felt a ... 6
- During the first roleplay, I didn't... 1
- Andere 0



16. Please elaborate on *why* you chose this answer

10
Antwoorden

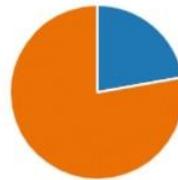
Meest recente antwoorden
*"I was in a customer role so I just thought as usual. And the pe...
 "I was assigned the card that I had to steal 2 products so my s...
 "Because you emphasized that we need to scan all the produc...*

3 respondenten (30%) antwoordden **card** op deze vraag.

lot of people thief
 person experiment self checkout researchers of this
situation products card subjective nc
 real situation **checkout** successfully stole view
 confusing fellow students neec
 object

17. During the second roleplay in this research, which statement would describe your perspective on the subjective norm (= a shared standard of acceptable behavior by society) of theft at the self-checkout the best?

- During the second roleplay, I fel... 2
- During the second roleplay, I fel... 7
- During the second roleplay, I di... 0
- Andere 0



18. Please elaborate on *why* you chose this answer

9
Antwoorden

Meest recente antwoorden
*"the person who played the thief said she was very nervous d...
 "The second roleplay I was a normal costumer so my subjecti...*

2 respondenten (22%) antwoordden **subjective norm** op deze vraag.

feeling! **nervous** **pressure** **eyes of t**
social standards **fellow participants** **normal costumer** **task** **nori**
external security **subjective norm** **kind** **n**
people **items** **actively steal** **participa**
eventhough i knew **theft** **second roleplay**

19. In the *hypothetical scenario* that you, as a customer of a supermarket, would occasionally **not scan all items** at the self-checkout, do you think this new design would act as a *barrier* in this process of potential theft?

- Yes, I feel that the new self-che...
- No, I don't feel that the new self... 1



20. Please elaborate on *why* you chose this answer

Meest recente antwoorden
10
 Antwoorden
"I think it's easier for people to spot other people's behavior in..."
"Because it makes you more aware of your surroundings and ..."
"Because it is easy to see the others "

3 respondenten (30%) antwoordden **people** op deze vraag.

aware of your surroundings conscious centralized locati
 social pressure **aware** people **easy** corp
 visible
 likely theft of products easily asses people's behavior r'
 left right customers camera

21. Do you perceive your *control over your actions* at this newly designed self-checkout to be **unchanged**, **increased**, or **decreased** compared to self-checkouts in current supermarkets

- I feel **the same amount of control**... 4
- I feel an **Increase in control** ov... 3
- I feel a **decrease in control** ove... 3



22. Please elaborate on *why* you chose this answer

10
Antwoorden

Meest recente antwoorden

"Because on the round table, my behavior is more likely to be...
 "I am more aware of the people watching me so I would not ...
 "Because I focused on the experiment and did not realize the ...

2 respondenten (20%) antwoordden **control** op deze vraag.

behavior is more likely shopping bag round table
 taken away self scan control people
 circle aware of the people better scan checkouts
 observed

23. Do you believe that a stealer in reality would *re-evaluate*(=evaluate again) their behavioral outcomes and give greater consideration to the **negative consequences** when encountering this newly designed self-checkout?

- Yes, I believe a re-evaluation of... 6
- No, I don't believe a re-evaluati... 4

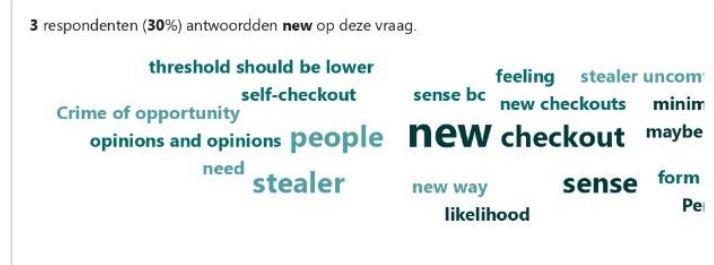


24. Please elaborate on *why* you chose this answer

10
Antwoorden

Meest recente antwoorden

"Sometimes thieves don't care about other people's opinions ...
'It depends on how committed they are to stealing. They can ...
'The changing in the environment can be effect their actions..."



25. In the case you were a stealer in the roleplays of the research, did you think about possible negative consequences of your behavior?

- Yes, I thought about the possibl... 4
- No, I didn't think about the poss... 2
- I was not a stealer during the rol... 4



01-11-2023 20:58

Environmental restructuring of the self-checkouts of supermarkets

26. Please elaborate on *why* you chose this answer

7
Antwoorden

Meest recente antwoorden

"Because I was afraid that someone would catch me and poin...



E. Observation schemes

Roleplay 1: not stealer(s) GROUP 1	
Do people interact with each other in general while performing their tasks?	R2: No, they only look at the groceries, but they did ask/communicate about who is going to stand where when walking in R4: Participants seldom interacted
Do the participant notice a person not scanning all items (look at eye-movement/ movements)	R2: No, they didn't, but they knew someone is going to have that assignment R4: No, they only paid attention to their own stuff
Do people non-verbal respond to the stealer not scanning all items	R2: No, participants were not looking at each other R4: No, there was no non-verbal communication noted. Only at the end did participants make eye contact when they were finished paying and were ready to leave.
Is there verbal communication about stealing? What is said?	R2: No R4: No

Roleplay 2: not stealer(s) GROUP 1	
Do people interact with each other in general while performing their tasks?	R2: No, only again who is going to stand at which self-checkout. R4: Not noticeably
Do the participant notice a person not scanning all items (look at eye-movement/ movements)	R2: After asking, yes they could both point out the stealer R4: Yes, they did
Do people non-verbal respond to the stealer not scanning all items	R2: Participants were giving side eyes to each other while scanning their own products. They tried to look without being noticed that they were looking. R4: Nearly every of non-stealer did an eye-check on others to see if someone was stealing. They did this eye-check regularly like everytime they finished scanning an item. Although non-stealers found the stealer, they tend not to denounce him/her.
Is there verbal communication about stealing? What is said?	R2: No R4: No

Roleplay 1: stealer GROUP 1	
Do people interact with each other in general while performing their tasks?	R1: Mainly look to their own stuff R3: No
Does the stealer use strategies for being unnoticed while stealing? (Where does he/she stand? What does he/she do?)	R1: Slower than the others Taking two items at once R3: Stealer took 2 products at the same time, bigger and smaller (the gum). Hiding with the bag, Participant wasn't stealing because of the price, just because the gum is small and easy to steal.
How does the stealer respond to (not) being caught non-verbally ?	R1: Smiling R3: Smiling, proud, doesn't look up
How does the stealer respond to (not) being caught verbally ?	

Extra notes: One participant mentioned that even when she would notice someone stealing in real life, she would not say something about it or turn that person in, because it is not her responsibility.

Roleplay 2: stealer GROUP 1	
Do people interact with each other in general while performing their tasks?	R1: More to own, but looking around as well R3: No
Does the stealer use strategies for being unnoticed while stealing? (Where does he/she stand? What does he/she do?)	R1: Fast, moves it below and uses two items at the same time R3: Using both hands while scanning, one for stealing, one for scanning another product. Forgets to put the products in the bag while scanning, only realizes that in the end. Tries to pay twice with the phone, to show that they paid. Poker face. Really fast scanning.
How does the stealer respond to (not) being caught non-verbally ?	R1: Not caught, stressing behavior. Not packing a bag, forgot because participant was thinking too much about stealing
How does the stealer respond to (not) being caught verbally ?	R1: No, verbal communication between them. Afterward they knew who did it. The stealer still paid attention to others while being the stealer.

Extra notes: Two-people tactics are easier, putting the groceries directly into the bag disguises the stealing.

Roleplay 1: not stealer(s) GROUP 2	
Do people interact with each other in general while performing their tasks?	R2: No, it's very quiet and participants seem to be really focused on their own space of the self-checkout R4: No, focused only on themselves
Do the participant notice a person not scanning all items (look at eye-movement/ movements)	R2: No, they were too busy with their own groceries R4: No
Do people non-verbal respond to the stealer not scanning all items	R2: No R4: No
Is there verbal communication about stealing? What is said?	R2: No R4: No

Roleplay 2: not stealer(s) GROUP 2	
Do people interact with each other in general while performing their tasks?	R2: No R4: No
Do the participant notice a person not scanning all items (look at eye-movement/ movements)	R2: No they didn't R4: No
Do people non-verbal respond to the stealer not scanning all items	R2: No R4: No
Is there verbal communication about stealing? What is said?	R2: No R4: No

Roleplay 1: stealer GROUP 2	
Do people interact with each other in general while performing their tasks?	R1: Busy with scanning own items a lot R3: No
Does the stealer use strategies for being unnoticed while stealing? (Where does he/she stand? What does he/she do?)	R1: Checks for barcode, puts in bag while holding R3: Not a good stealer, confused. Smaller items. Didn't think any of the other people at the checkout will see, more afraid of cameras and people around.
How does the stealer respond to (not) being caught non-verbally ?	R1: Not noticing
How does the stealer respond to (not) being caught verbally ?	R1: No response to others

Extra notes: Limitation: because we were watching the behavior it felt like cameras were on them which changed their perception.

Roleplay 2: stealer GROUP 2	
Do people interact with each other in general while performing their tasks?	R1: Not really, didn't also notice which person was stealing (I also didn't see it) R3: No
Does the stealer use strategies for being unnoticed while stealing? (Where does he/she stand? What does he/she do?)	R1: Participant forgot that she was stealing R3: The stealer finished earlier, but too focused on their own. Didn't push the bell once, obvious for the observers, but the other customers didn't notice. 2 things at once
How does the stealer respond to (not) being caught non-verbally ?	
How does the stealer respond to (not) being caught verbally ?	

Roleplay 1: not stealer(s) GROUP 3	
Do people interact with each other in general while performing their tasks?	R2: No, it's very quiet R4: In general, people didn't interact
Do the participant notice a person not scanning all items (look at eye-movement/ movements)	R2: One participant looked up multiple times R4: Some people looked up and scanned the room
Do people non-verbal respond to the stealer not scanning all items	R2: No, they didn't notice
Is there verbal communication about stealing? What is said?	R2: No

Roleplay 2: not stealer(s) GROUP 3	
Do people interact with each other in general while performing their tasks?	R2: No
Do the participant notice a person not scanning all items (look at eye-movement/ movements)	R2: Yes, they were really checking. 2/3 not-stealers saw the stealer and looked at at other's actions
Do people non-verbal respond to the stealer not scanning all items	R2: No, I did notice that at the end, the participants were copying each others behavior of placing all the items to one side of the checkout for the next roleplay, and folding the bag two times while looking at each other. R4: When they did eye checks, it was easy for them to find out the stealer, even when the stealing behavior was not easily noticeable.
Is there verbal communication about stealing? What is said?	R2: No

Roleplay 1: stealer GROUP 3	
Do people interact with each other in general while performing their tasks?	R1: Quiet R3: Couldn't notice who the stealer was
Does the stealer use strategies for being unnoticed while stealing? (Where does he/she stand? What does he/she do?)	R1: Putting bag on the basket side
How does the stealer respond to (not) being caught non-verbally ?	
How does the stealer respond to (not) being caught verbally ?	

Roleplay 2: stealer GROUP 3	
Do people interact with each other in general while performing their tasks?	R3: No
Does the stealer use strategies for being unnoticed while stealing? (Where does he/she stand? What does he/she do?)	R1: Not looking up , the stealer is slower than others (I didn't notice this myself) R3: Two products together, small products. Forgot to pay in the end
How does the stealer respond to (not) being caught non-verbally ?	R1: Afterwards, when participants noticed she was caught, she felt nervous
How does the stealer respond to (not) being caught verbally ?	R1: No-one talks during the process.

F. ERB Form



Ethical Review Form

(Version 2.1)

This Ethical Review Form should be completed for every research study that involves human participants or personally identifiable personal data and should be submitted to ethics@tue.nl. For more information about how this process works please click [here](#). Please check if you are using the correct form: Ethical Review Form (version 2.1). Please click [here](#) to obtain this latest version.

Part 1: General Study Information		
1	Project title / Study name	Shoplifting at self-checkout
2	Name of the researcher / student	Ioana-Maria Caramiciu Susan Draaijer Rosanna Henstra Liu Haoyu Jochem Verstegen
3	Email of the researcher / student	i.caramiciu@student.tue.nl s.h.m.l.draaijer@student.tue.nl r.t.w.henstra@student.tue.nl h.liu6@student.tue.nl j.r.p.verstegen@student.tue.nl
4	Supervisor(s) name(s) <i>Additional explanation: Please write down the name of your direct supervisor. You can mention several supervisors if appropriate, but at least one supervisor should be mentioned.</i>	Panos Markopoulos Harm van Essen
5	Supervisor(s) email address(es) <i>Additional explanation: Please give the email address of the supervisor(s) mentioned in question 4.</i>	h.a.vessen@tue.nl p.markopoulos@tue.nl
6	Department / Group <i>Additional explanation: Please specify group if relevant e.g. JADS or HTI</i>	Industrial Design
7	What is the purpose of this application?	<input type="checkbox"/> Scientific study <input type="checkbox"/> Bachelor education. Course:..... <ul style="list-style-type: none"> • <input checked="" type="checkbox"/> Master education. Course: DDM110 Design for behavioral change <input type="checkbox"/> Other (e.g. external, following external regulations):.....
8	Research location <i>Additional explanation: Where will the data collection take place? On campus, in a company, in public space, online, etc.</i>	<input checked="" type="checkbox"/> Eindhoven University of Technology campus <input type="checkbox"/> Other, name organization(s):..... <input type="checkbox"/> Public space <input type="checkbox"/> Online
9	Start date data collection <i>Additional explanation: Please state when your data collection will start. Please note that you do not have to provide information about your complete (PhD) project, but only on this particular sub-study that you are submitting for approval in this form.</i>	26/10/2023
10	End date data collection	02/11/2023

1

Ethical Review Form

11	Does your project receive external funding (e.g., NWO, relevant for special regulations from funders)?	<input type="checkbox"/> Yes. Name Funder: <input checked="" type="checkbox"/> No
12	<p>Which internal and external parties are involved in the study? Think about sharing data or information between TU/e and other universities, commercial companies, hospitals, etc.</p> <p><u><i>Additional explanation:</i></u> <i>Describe all internal and external parties that are involved in the study or project, including:</i></p> <ul style="list-style-type: none"> • <i>researchers or research groups at the TU/e who participate in the study;</i> • <i>(Researchers at) other universities/institutions that provide data/services, help analyzing the data, etc.;</i> 	<p>Internal parties</p> <ul style="list-style-type: none"> • Researcher(s): Ioana-Maria Caramiciu, Susan Draaijer, Rosanna Henstra, Liu Haoyu, Jochem Verstegen • Supervisor: Panos Markopoulos and Harm van Essen

Ethical Review Form

	<ul style="list-style-type: none"> (commercial) partners, companies, government bodies, municipalities, consultancy firms, hospitals or care institutions that provide data (e.g., contact details of participants, data for further analysis). <p><i>Indicate which role each party plays: who defines the means and purposes in the study, who will supply the data (external parties?), who will process/handle the data, who will be able to access the data during and after research (only researchers at TU/e or also others)?</i></p>	<p>External parties</p> <ul style="list-style-type: none"> Other universities/institutions: Others:
13	Have any special agreements already been made with an external party, such as a Non-Disclosure Agreement (NDA) or a data sharing agreement?	<input type="checkbox"/> Yes, namely: <input checked="" type="checkbox"/> No
14	Has your proposal already been approved by an external Ethical Review Board or Medical Ethical Review Board? <i>Additional explanation: For example, when you are collaborating with another university and the project has been approved by their Ethical Review Board, or when you received a WMO-waiver from a Medical Ethical Review Board.</i>	<input checked="" type="checkbox"/> Yes <input checked="" type="checkbox"/> No
15	If yes: Please provide the name, date of approval and contact details of the ERB. Please also include the registered number for your project approval. Additionally, please send in the Ethical Review Form upon which ethical approval was granted together with this form.	
16	If you process personal data that are likely to result in high privacy risks for participants, you need to perform a Data Protection Impact Assessment (DPIA). Have you done this for this or a very similar project? <i>Please read the information below: a DPIA is not the same as a regular privacy impact assessment. More detailed questions on privacy will follow in the section below.</i> <i>Additional explanation: A Data Protection Impact Assessment (DPIA) is a formal document that must be drafted under the guidelines of the General Data Protection Regulation (GDPR). Think of research with vulnerable people, high-risk medical research, The Dutch DPA (Autoriteit Persoonsgegevens) and our website provides more information about a DPIA.</i>	<input checked="" type="checkbox"/> Not applicable (no high privacy risks) <input type="checkbox"/> Yes (the form is attached to the application) <input type="checkbox"/> No

Part 2: Medical study

1	Does the study have a medical scientific research question or claim? <i>Additional explanation: Medical/scientific research is research which is carried out with the aim of finding answers to a question in the field of illness and health (etiology, pathogenesis, signs/symptoms, diagnosis, prevention, outcome or treatment of illness), by systematically collecting and analyzing data. The research is carried out with the intention of contributing to medical knowledge which can also be applied to populations outside of the direct research population. If your research contains questions about health and health related parameters (such as well-being, vitality, feelings of anxiety or stress) but your research question is not primarily medical, then you can answer 'no' to this question.</i>	<input type="checkbox"/> Yes* <input checked="" type="checkbox"/> No <p>*If yes or in doubt, please contact Susan Hommerson via s.m.hommerson@tue.nl</p>
---	----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

Ethical Review Form

Part 3: Use of (medical) devices in the study		
1	Does your research include a device? <i>Additional explanation: A device is a complete piece of physical hardware that is used to compute or support computer functions within a larger system. Devices can be divided into input-, output-, storage-, internet of things-, or mobile device.</i>	<input type="checkbox"/> Yes, not self-made <input type="checkbox"/> Yes, self-made <input checked="" type="checkbox"/> No
2	Please describe your device or link to an online description of the device	
3a	Will you use a device that is 'CE' certified for unintended use (meaning you will use existing CE certified devices for other things than they were originally intended for) or use a device that is not 'CE' certified? <i>Additional explanation: You can find more information about CE certification here</i>	<input checked="" type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> <input type="checkbox"/>
3b	If no: Please explain to what extent the device was assembled according to relevant standards and provide a risk assessment <i>Additional explanation: You can find more information about a risk assessment here</i>	
3c	If yes: Do you use a device or software that has a medical purpose such as diagnosis, prevention, monitoring, prediction, prognosis, treatment or alleviation of disease or injury?	<input type="checkbox"/> Yes, my device or software currently has a medical purpose <input type="checkbox"/> Yes, my device or software could have a medical purpose in the near future <input type="checkbox"/> No <input type="checkbox"/> I'm not sure
Part 4: Information about the study		
1	What are your main research questions? <i>Additional explanation: You need to provide at least one clear research question.</i>	Would the environmental restructuring of the self-checkout positively influence the stealing behavior?
2a	Please check the box that indicates the relevant study population <i>Additional explanation: Please select which persons are eligible for your study.</i>	<input checked="" type="checkbox"/> Students <input type="checkbox"/> General healthy population <input type="checkbox"/> General population with specific feature, e.g., pregnancy, specifically <input type="checkbox"/> Patients, specifically <input type="checkbox"/> Other, specifically
2b	Age category of participants	<input type="checkbox"/> Younger than 12 years of age <input type="checkbox"/> Older than 11 and younger than 16 years of age <input checked="" type="checkbox"/> 16 years or older
3	Description of the research method (select all that applies)	<input type="checkbox"/> (Semi-structured) interviews <input checked="" type="checkbox"/> Surveys

Ethical Review Form

	<p><i>Additional explanation: Please specify your research method.</i> <i>Note that you need to provide information about the research method in an additional file that you attach to the ERB form.</i> <i>E.g., for interviews you provide the interview questions, for surveys you provide the survey questions, etc.</i></p>	<input type="checkbox"/> Group workshops/roundtable discussions <input type="checkbox"/> Diary studies <input checked="" type="checkbox"/> Behavioral observations <input type="checkbox"/> Building sensor data <input type="checkbox"/> Wearable device (e.g. Fitbit watch, on-skin sensors) <input checked="" type="checkbox"/> User testing <input type="checkbox"/> Pilot study <input type="checkbox"/> GPS tracking/location data <input type="checkbox"/> Living Lab <input type="checkbox"/> Other, namely
4	<p>Description of the measurements and/or stimuli/treatments</p> <p><i>Additional explanation: Think about your outcome measures and the variables you will be collecting and describe them in a way such that another person understands what the participant will experience.</i></p> <p><i>For example: Participants will perform task A and see pictures from database B, and we measure validated Scale 1.</i></p>	<p>The participants would be asked to interact with a newly designed Self-checkout.</p> <p>The participants will be explained the user test: "Here in front of you, you see a new construct of the self-checkout with 4 check-outs in one table, where you would place the supermarket shopping cart to the right of you, and your personal bag to the left (which you can see here in the render). The idea is that you will transfer your items from your shopping cart to your bag, and while doing this you will scan this item. In this test, the bell in the middle functions as the scanner. So the beep you hear when you would normally scan an item is now re-enacted with this bell.</p> <p>So when we start, you will come through this door, you will start scanning your items and after you are done, you will pay for your groceries by just holding your phone to this area. Afterwards you can just walk out, and leave the groceries to the left side of the table. - Is everything clear so far? -</p> <p>Before we start, you will get a card which explains an assignment of what you need to do during the role-play.</p> <ul style="list-style-type: none"> 1. hand out cards 2. Ask if the assignment is clear for everyone 3. If something is unclear, walk away from the group with this person and explain the assignment" <p>During the user test the researchers will observe</p> <ul style="list-style-type: none"> • Observe if people respond to the stealer not scanning all items • Observe if there is verbal communication about stealing • Observe if people are looking and noticing each others actions

Ethical Review Form

		<p>Afterwards the participants would be asked 2 questions</p> <p><u>Question 1:</u></p> <p>Did anyone notice that one person of this group did not scan all items before placing it in their bag, and was thus stealing at the self-checkout?</p> <p>-allow for discussion-</p> <p><u>Question 2:</u></p> <p>Can the person who had the assignment to steal raise their hand and evaluate on your experience of stealing during this process?</p> <p>After the interaction, the participants would be asked to fill in a questionnaire to gain an understanding about how their behavior was influenced.</p> <p>The questionnaire would be consist of the informed consent form and a question per individual.</p>
5	<p>Describe and justify the number of participants you need for this study. Also justify the number of observations you need, taking into account the risks and benefits.</p> <p><i>Additional explanation: Think about if you need 3 or 30 participants for example, and why? Do they need to provide their input once, or several times, and why? If relevant, specify the duration of the study per participant and the compensation that is needed for the study.</i></p>	<p>At least two focus groups consisting 3-4 people each. The study needs multiple participants during each focus group to analyze their behavior in a situation as close as the normal shopping behavior at the self-checkout.</p>
6	<p>Explain why your research is societally important. What benefits and harm to society may result from the study?</p> <p><i>Additional explanation: What benefit will the results of your study have to society in general?</i></p>	<p>The research has the potential to environmentally restructure the self-checkout setup in order to decrease or even diminish the shoplifting behavior.</p>
7	<p>Describe the way participants will be recruited</p> <p><i>Additional explanation: How will you recruit participants for your study? For example, by using flyers, personal network, panels, etc.</i></p>	<p><input type="checkbox"/> Survey link posted online, e.g., social media platforms <input type="checkbox"/> On campus flyers <input checked="" type="checkbox"/> Personal network <input type="checkbox"/> Via a company, namely</p> <p><input type="checkbox"/> Via a hospital, namely</p> <p><input type="checkbox"/> Via an organization</p> <p><input type="checkbox"/> By a Consortium Partner, namely</p> <p><input type="checkbox"/> Other, namely</p>
8	<p>Provide a brief statement of the risks you expect for the participants or others involved in the study and explain. Also take into consideration any personal data you may gather and associated privacy issues.</p> <p><i>Additional explanation: Risks for the participants can be anything from risk of data breach to risk of safety or well-being (think about stress, extreme emotions, visual or auditory discomfort). Describe these possible risks and describe the way these risks are mitigated.</i></p>	<p>The risks of the study are minimal, the only possible risk is triggering guilt discomfort to the participants that might steal in a real life scenario. To avoid any privacy issues, their input is totally anonymized, using private questionnaire that are not connected to the participants.</p>

Ethical Review Form

Part 5: Self-assessment checklist

<i>Note: answers in the blue boxes indicate that your research is eligible for fast-track approval</i>		Yes	No
1a	Does the study involve human material? (e.g., surgery waste material derived from non-commercial organizations such as hospitals)		x
1b	Will blood or other (bio)samples be obtained from participants? (e.g., hair, sweat, urine or other bodily fluids or secretions, also external imaging of the body)		x
2	Will the participants give their consent – on a voluntary basis – either digitally or on paper? Or have they given consent in the past for the purpose of education or for re-use in line with the current research question?	x	
3	Are the participants, outside the context of the research, in a dependent or subordinate position to the investigator? Additional explanation: Think about doing research on your own students or on your own employees. When there is a dependency or power imbalance between you and the research participants, you need to answer 'yes' to this question.		x
4	Does the study involve participants who are particularly vulnerable or unable to give informed consent? (e.g., children (<16 years of age), people with learning difficulties, patients, people receiving counselling, people living in care or nursing homes, people recruited through self-help groups)		x
5	Will participating in the research be burdensome? (e.g., requiring participants to wear a device 24/7 for several weeks, to fill in questionnaires for hours, to travel long distances to a research location, to be interviewed multiple times)?		x
6	May the research procedure cause harm or discomfort to the participant in any way? (e.g., causing pain or more than mild discomfort, stress, anxiety or by administering drinks, foods, drugs, or showing explicit visual material)		x
7	Will financial inducement (other than reasonable expenses and compensation for time) be offered to participants? Additional explanation: For an explanation of what is considered a reasonable compensation, see the topic participant fees from the HTI group		x
8a	Will it be necessary for participants to take part in the study without their knowledge and consent at the time? (e.g., covert observation of people)		x
8b	If yes: Will you be observing people without their knowledge in public space? (e.g. on the street, at a bus-stop)		x
9	Will the study involve actively deceiving the participants? (e.g., will participants be deliberately falsely informed, will information be withheld from them, or will they be misled in such a way that they are likely to object or show unease when debriefed about the study)		x
10	Will participants be asked to discuss or report sexual experiences, religion, alcohol or drug use, suicidal thoughts, or other topics that are highly personal or intimate? Additional explanation: Think about your research population. For some participants, particular topics can be considered sensitive or intimate, whereas the same topics will not be perceived as such by other participants.		x
11	Elaborate on all boxes answered outside of the blue boxes in part 5. Describe how you safeguard any potential risk for the research participant.		

Ethical Review Form

Part 6: Self-assessment on privacy

The following questions (1-11) concern privacy issues, as laid down in the General Data Protection Regulation (GDPR). The Data Stewards and – if necessary – privacy team of TU/e will assess these questions. In some cases, more information is required to assess the privacy risks. If this is the case, you will be notified that the Data Stewards team will contact you.

The GDPR defines 'personal data' as any information relating to an identified or identifiable natural person ('data subject'). Personal data also includes data that indirectly reveals something about a natural person. Personal data can lead to the physical, physiological, genetic, mental, economic, cultural or social identity of a natural person. There are two main categories of personal data: regular personal data and special category personal data.

If you are not sure whether some of these questions below should be answered with a Yes or No, please contact a Data Steward first through rdmsupport@tue.nl.

Note: answers in the blue boxes indicate that your research is eligible for fast-track approval

		Yes	No
1	Will the study involve discussion/collection/processing of regular personal data, or will you collect and (temporarily) store video or voice recordings for the purpose of conducting interviews?	<input checked="" type="checkbox"/>	
	<p><i>Additional explanation:</i> For example, name, address, phone number, email address, IP address, gender, age, video or interview recordings? If you are not sure whether your data contains personal data, please contact the Data Stewards Team (rdmsupport@tue.nl).</p>		
1A	If yes: Please describe which regular personal data you will collect in this study?		
2	Will the study involve discussion/collection/processing of special category personal data or other sensitive data?	<input checked="" type="checkbox"/>	
	<p><i>Additional explanation:</i> Examples of special category personal data are race, religion, health information, political views, genetic or biometric data for the unique identification of a person, sexual preference, etc. Health information concerns personal data of the physical or mental health of persons, including the provision of health care. Examples of other sensitive data is information such as communication data, financial records or credit scores, camera surveillance data, location/GPS data, internet-of-things data, employee monitoring, observing or influencing behaviour, criminal records, data of vulnerable persons (children, people with disabilities, refugees), BSN number etc. Please be aware that the use of special category personal data in research requires extra security measurements in order to safeguard the privacy of data subjects and to comply with the GDPR. Processing of this special category data is prohibited, except for specific purposes and under certain circumstances. If you need to process special category data, please consult the data stewards at rdmsupport@tue.nl.</p>		
2A	If yes: Please describe which special-category personal data and/or sensitive data you will collect in this study?		

If you answered yes to either question 1 or 2, please answer the questions below. If you answered no to both questions, you can skip this part and continue onto part 7. Also, if an answer to any of the following questions is 'yes', please contact a Data Steward at rdmsupport@tue.nl

		Yes	No
3	Will your project involve the processing of personal data on a large scale ?	<input checked="" type="checkbox"/>	
	<p><i>Additional explanation:</i> In general, any processing that involves more than 10.000 data subjects should be considered "large scale". However, if the data of approximately 1000 persons (or more) are involved, the data processing may still be considered large scale. In that case, besides the number of persons involved in the study, one should also assess (i) the amount of data collected from these persons taking into account the type/risk level of the personal data, (ii) the duration of the data processing, (iii) the geographic scope or extent of the processing. For example, if you would collect and process data across several European countries with 10+ socio-economic data items of 1200 individual persons for several years in a row, that is likely "large-scale processing". Other examples of a large-scale processing activity are:</p> <ul style="list-style-type: none"> • Monitoring driving behavior of road users on Dutch highways • Collecting data of Covid patients 		

Ethical Review Form

	<ul style="list-style-type: none">• <i>A hospital that processes patient data as part of its usual operations</i>		
--	---------------------------------------------------------------------------------------------------------------------------------	--	--

Ethical Review Form

	<ul style="list-style-type: none"> A transport company that processes travel information of people who travel by public transport in a certain city. For example, by tracking them through travel maps. 	x
4	<p>Does this processing activity involve the use of new or innovative technologies?</p> <p><i>Examples of a new technology: combining fingerprints and facial recognition for physical access control, the use of bodycams in public spaces, the use of new technical methods in conducting research such as AI. This question also refers to new technologies that have not been deployed by TU/e so far.</i></p>	x
5	<p>Does your study involve systematic (c.q. automated) monitoring of persons?</p> <p><i>Additional explanation: Consider data processing activities that have the purpose of observing, monitoring or controlling individuals, for example in circumstances where the individuals are not aware by whom their personal data is collected and how it is used. Examples of such activities are using camera systems to monitor driving behavior on highways, monitoring email inactivity or employee phone use, certain applications of machine learning and artificial intelligence.</i></p>	x
6	<p>Does the study involve collaborations (with third parties) in which data are shared or exchanged in order to link or combine data?</p> <p><i>Additional explanation: This may often apply in a collaboration between the university and a commercial party, contract research, etc. It is important to assess this for all data in the entire project, not just your own data. An important consideration in this situation is whether the person whose data is involved could have expected that data from these different databases or sources of information were to be combined. For example, it is less likely for data subjects to expect that databases from different parties will be combined and the results are used for different purposes than one could reasonably expect; this may apply for example in a collaboration between the university and a commercial party.</i></p>	x
7	<p>Will the study include data processing activities that prevent data subjects from exercising their rights or using a service or contract?</p> <p><i>Additional explanation: Examples include processing operations carried out in public places that people cannot avoid (train station, airport, shopping mall, public university premises, etc.) or processing operations whose purpose is to allow or not allow data subjects to use a service or enter into a contract (examples: by refusing to pay a benefit, not being able to apply for a loan, etc.).</i></p>	x
8	<p>Will the study process personal data to score, rank or profile persons?</p> <p><i>Additional explanation: Examples: monitoring (highway) roads to give road users a "score" based on their detected driving behavior, a bank assessing its customers based on their creditworthiness, or an organization building behavioral and marketing profiles based on use of their website or navigating their website.</i></p>	x
9	<p>Does your data processing include activities that involves composing "blacklists" – and, in particular, in relation to sensitive or special category data, such as communication data, financial records or credit scores, genetic data, biometric data, health data, camera surveillance data, location/GPS data, internet-of-things data, employee monitoring, observing or influencing behaviour, etc.</p> <p><i>Additional explanation: This situation will not be a common occurrence in research, but you may indirectly be involved in this. In general, this typically concerns processing operations involving personal data relating to criminal convictions and offences, data relating to unlawful acts, data concerning unlawful or annoying behaviour or data concerning bad payment behaviour by companies or individuals are processed and shared with third parties (blacklists or warning lists, as used, for example, by insurers, hospitality companies shopping companies, telecom providers as well as blacklists relating to unlawful behavior of employees, for example in the healthcare sector or by employment agencies, etc.).</i></p>	x
10	<p>Will personal data be transferred or shared outside the EU/EEA?</p> <p>EU data protection rules apply to the European Economic Area (EEA), which includes all EU countries and non-EU countries Iceland, Liechtenstein and Norway.</p> <p><i>Additional explanation: The GDPR has drafted additional requirements for transfers data outside of the EU/EEA. Typically, additional safeguards must be implemented to protect the personal data of residents in the European Union. For example, if you collaborate with an American, Indian or Chinese university or other third party outside the EU/EEA, you must first check whether this is allowed and under which conditions this is allowed. Another typical example is storage of data on American providers of cloud (storage) services. Please contact the data stewards first to discuss this.</i></p>	x
11	<p>Will any raw or anonymized personal data or any other sensitive data or research results from the project possibly be transferred to a high-risk country*?</p> <p><i>*High risk countries: China, Russia, Iran, Turkey, and North Korea.</i></p> <p><i>If personal data or other potentially sensitive data is exchanged with one of these countries, or if part of the data processing takes place in one of these countries: an advice from the Data Protection Officer, the kennisveiligheidsteam (Knowledge Security team), and the CSO (Chief Information Security Officer) is ALWAYS required.</i></p>	x

Ethical Review Form

Part 7a: Processing of research data		
1	<p>Is consent your legal basis for processing the personal data in your study?</p> <p><i>Additional explanation: What is a legal basis? One of main principles in the GDPR is to ensure that personal data is processed lawfully, fairly, and transparently. To comply with this principle, the processing of personal data also requires that you have a valid legal basis for the personal data processing activity.</i></p> <p><i>In research projects, the legal basis is often but not always consent. However, it is possible that it is not clear or not possible to establish whether to use consent as a legal basis.</i></p> <p><i>Some examples where consent may not be applicable as legal basis are covert research, data collection in public spaces, secondary data analysis of existing data, data that are transferred to you by a third party, consent is not possible or would require disproportionate effort, etc. In that case, please indicate which legal basis you think that applies or (preferably) contact a data steward first.</i></p>	<input type="checkbox"/> Yes and it will be obtained via An informed consent template* is attached to this application. <input type="checkbox"/> No, I will use another legal basis to process the data. Namely,, * You can download a suitable template here .
2	Where will the data come from?	<input type="checkbox"/> Data obtained from another party (secondary data use) <input type="checkbox"/> New data collected only by my research team <input type="checkbox"/> New data collected together with collaborators
3	Which of the following tools will you use to process personal data?	<p>Surveys</p> <input type="checkbox"/> Qualtrics <input type="checkbox"/> Limesurvey <input checked="" type="checkbox"/> MS Forms <input type="checkbox"/> Other, namely <p>Interview/workshop recordings</p> <input type="checkbox"/> Voice/video recorder <input type="checkbox"/> Phone in a flight mode <input type="checkbox"/> MS Teams <input type="checkbox"/> Other, namely <p>Transcription</p> <input type="checkbox"/> Manual transcription <input type="checkbox"/> Microsoft Office software (e.g. Word, Teams) <input type="checkbox"/> Other, namely <p>Statistical analysis</p> <input type="checkbox"/> SPSS <input type="checkbox"/> R <input type="checkbox"/> Other, namely <p>Other tools, specifically.....</p>
4	Where will the data and in particular the personal data be stored during and after completion of the study? If you have already uploaded your Data Management Plan, you can refer to your Data Management Plan.	<input checked="" type="checkbox"/> SURF drive <input checked="" type="checkbox"/> Onedrive <input type="checkbox"/> Research Drive <input type="checkbox"/> Network Drive

Ethical Review Form

<p><i>Additional explanation:</i> University supported storage facilities are SURFdrive, SURF Research Drive, Ceph, departmental drives (this includes BE Project Drive), and the TU/e instance of Microsoft OneDrive. For most personal data, the use of SURF Research Drive, departmental drives (including BE Project Drive) and SURFdrive is required.</p>	<input type="checkbox"/> Research Manager <input type="checkbox"/> Other, namely
Part 7b: Safety and security measures	
1 Will you pseudonymize/anonymize the data? <i>Additional explanation:</i> Anonymization: remove all direct identifiers (name, address, telephone number etc.) but also indirect identifiers (age, place of birth, occupation, salary) that, linked with other information, can lead to a person's identification. Anonymization to the point that a data subject is no longer identifiable means that the anonymized data is not considered to be personal data anymore. Pseudonymization: replacing the unique identifier of a data subject with an artificial pseudonym. This means that identification is still possible with the identification key. The identification key needs to be stored securely and separately from the pseudonymized data. If the data subject can be identified by combining data with additional information, the data is also called pseudonymous.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No If yes, describe how:
2 Is access to (personal) data restricted? (Select all that apply)	<input type="checkbox"/> No <input type="checkbox"/> Yes, via access control <input type="checkbox"/> Yes, via password protection <input checked="" type="checkbox"/> Yes, access only given to TU/e research team <input type="checkbox"/> Yes, access only given to research team, including non-TU/e collaborators <input type="checkbox"/> Other, specify.....
3 Who will have access to the data during and after completion of the project? (Select all that apply)	<input type="checkbox"/> Main researcher <input checked="" type="checkbox"/> TU/e supervisor(s) <input type="checkbox"/> External supervisors <input checked="" type="checkbox"/> TU/e research team <input type="checkbox"/> Other, specify.....
4 Will you store data for future research?	<input checked="" type="checkbox"/> No <input type="checkbox"/> Yes, in a public data repository <input type="checkbox"/> Yes, in a public data repository under restricted access <input type="checkbox"/> Yes, in a TU/e-recommended storage (SURF Research Drive, Network Drive)
5 Will you share data outside the TU/e?	<input checked="" type="checkbox"/> No <input type="checkbox"/> Yes, in a fully anonymized form <input type="checkbox"/> Yes, raw or pseudonymized data*
<small>*If you selected this box, make sure that a suitable data agreement is put in place. You can contact the Data Stewards for support in preparing such an agreement</small>	
6 How long will data be stored after the end of the project?	3 months

Ethical Review Form

Part 8: Closures and Signatures	
1	Enclosures (tick if applicable and attach to this form): <input checked="" type="checkbox"/> Informed consent form <input type="checkbox"/> Informed consent form for other agencies when the research is conducted at a location (such as a school) <input type="checkbox"/> Text used for ads (to find participants) <input type="checkbox"/> Text used for debriefings <input type="checkbox"/> Approval other research ethics committee <input type="checkbox"/> The survey the participants need to complete, or a description of other measurements <input type="checkbox"/> Data Protection Impact Assessment checked by the privacy officer <input type="checkbox"/> Data Management Plan checked by a data steward
2	Signature(s) Signature(s) of applicant(s) Ioana-Maria Caramiciu  Susan Draaijer  Rosanna Henstra  Liu Haoyu  Jochem Verstegen  Date: 25/10/2023 Signature research supervisor Date:

G. Informed Consent form – file

1. Introduction

You have been invited to take part in research project environmental restructuring of the self-checkouts of supermarkets,because you were contacted by one of the researchers and agreed to participate.

Participation in this research project is voluntary: the decision to take part is up to you. Before you decide to participate we would like to ask you to read the following information, so that you know what the research project is about, what we expect from you and how we deal with processing your personal data. Based on this information you can indicate via the consent declaration whether you consent to take part in this research project and the processing of your personal data.

You may of course always contact the researchers Ioana-Maria Caramiciu, Susan Draaijer, Rosanna Henstra, Liu Haoyu, Jochem Verstegen via i.caramiciu@student.tue.nl s.h.m.l draaijer@student.tue.nl r.t.w.henstra@student.tue.nl h.liu6@student.tue.nl j.r.p.verstegen@student.tue.nl, if you have any questions, or you can discuss this information with people you know.

2. Purpose of the research

This research project will be managed by Ioana-Maria Caramiciu, Susan Draaijer, Rosanna Henstra, Liu Haoyu, Jochem Verstegen

The purpose of this research project is to understand how the environmental restructuring of the self-checkout is influencing shopping behavior.

3. Controller in the sense of the GDPR

TU/e is responsible for processing your personal data within the scope of the research. The contact details of TU/e are:

Technische Universiteit Eindhoven
De Groene Loper 3
5612 AE Eindhoven

4. What will taking part in the research project involve?

You will be taking part in a research project in which we will gather information by: semi-structured interviews, observations and questionnaire.

- Interviewing you about your shopping behavior during the user test and to write down/record your answers via audio/video. Also, we will make a transcript of the interview.
- Presenting you a questionnaire about your shopping experience before and during the user test which you can fill in writing
- Observation

5. Potential risks and inconveniences

Your participation in this research project does not involve any physical, legal or economic risks. You do not have to answer questions which you do not wish to answer. Your participation is voluntary. This means that you may end your participation at any moment you choose by letting the researcher know this. You do not have to explain why you decided to end your participation in the research project.

6. Withdrawing your consent and contact details

Participation in this research project is entirely voluntary. You may end your participation in the research project at any moment, or withdraw your consent to using your data for the research, without specifying any reason. Ending your participation will have no disadvantageous consequences for you.

If you decide to end your participation during the research, the data which you already provided up to the moment of withdrawal of your consent will be used in the research.

Do you wish to end the research, or do you have any questions and/or complaints? Then please contact one of the researchers via email.

If you have specific questions about the handling of personal data you can direct these to the data protection officer of TU/e by sending a mail to functionarisgegevensbescherming@tue.nl. Furthermore, you have the right to file a complaint with the Dutch data protection authority: the Autoriteit Persoonsgegevens.

Finally, you have the right to request access, rectification, erasure or adaptation of your data. Submit your request via privacy@tue.nl.

7. Legal ground for processing your personal data

The legal basis upon which we process your data is consent.

8. What personal data from you do we gather and process?

Within the framework of the research project we process the following personal data:

Category	Personal data
Contact data	o
Job profile	o
Medical data	o
Student data	o

Within the framework of the research project your personal data will be shared with

- Storage solution: SURF ResearchDrive, Microsoft (Netherlands) on TU/e server

9. Confidentiality of data

We will do everything we can to protect your privacy as best as possible. The research results that will be published will not in any way contain confidential information or personal data from or about you through which anyone can recognize you, unless in our consent form you have explicitly given your consent for mentioning your name, for example in a quote.

The personal data that were gathered via audio recordings, (on-line) surveys, interviews, anonymized pictures and other documents within the framework of this research project, will be stored on storage facilities that are supported by the ICT service of TU/e.

The raw and processed research data will be retained for a period of 3 months. Ultimately after expiration of this time period the data will be either deleted or anonymized so that it can no longer be connected to an individual person. The research data will, if necessary (e.g. for a check on scientific integrity) and only in anonymous form be made available to persons outside the research group.

This research project was assessed and approved on [date] by the ethical review committee of Eindhoven University of Technology.