

Deposit packaging collection

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Redesigning a reverse vending machine to adapt it to unstaffed hub locations.

To make an impact on the way resources are being consumed and work towards a more circular economy, reuse and recycling are two important ways to go about this. Packaging deposits have been proven to be effective in collecting returns where the packaging materials stays of high quality (Bergsma, G. & Warringa, G. & Schep, E. 2017). For materials like glass this means reuse is possible if damage to the packaging is minimal. PET returns can be recycled as the material quality is high enough where not a lot of new material has to be used to produce a new bottle (reuse is not recommended due to hygiene risks). With new ruling on the way from the government with their goal to add a deposit on metal cans increasing this return flow, Boa Nova started their Pick up Club initiative. By using the real estate at gas stations that become vacant more often due to self-service taking that sector by storm (Vogel, C. 2018), strategic locations become available for circular hubs. By combining existing services like toilet facilities with new ones like grocery pickup, package pickup/drop off and Package deposit returns, a unique solution gets created for the growing issues with home delivery like the amount of delivery vans in densely populated areas. By making pick-up available on strategically well-connected locations and offering a full range of services, consumers have the unique option of taking care of their needs while being on the move. With grocery pickup comes the responsibility to also take in deposit packaging, which is the focus of the thesis.

As the intended use case adds some unique challenges, the use of an existing solutions might not be possible. This thesis aims to answer to question whether the use case would be feasible with a redesigned/adapted Return Vending Machine (RVM). Two main challenges arrive with this implementation (based on several interviews with consumers and RVM holders):

- Limited staff available at the location to do maintenance and to assist customers with questions.
- As the locations vary a lot in size the RVM must be fit for deployment in small spaces.

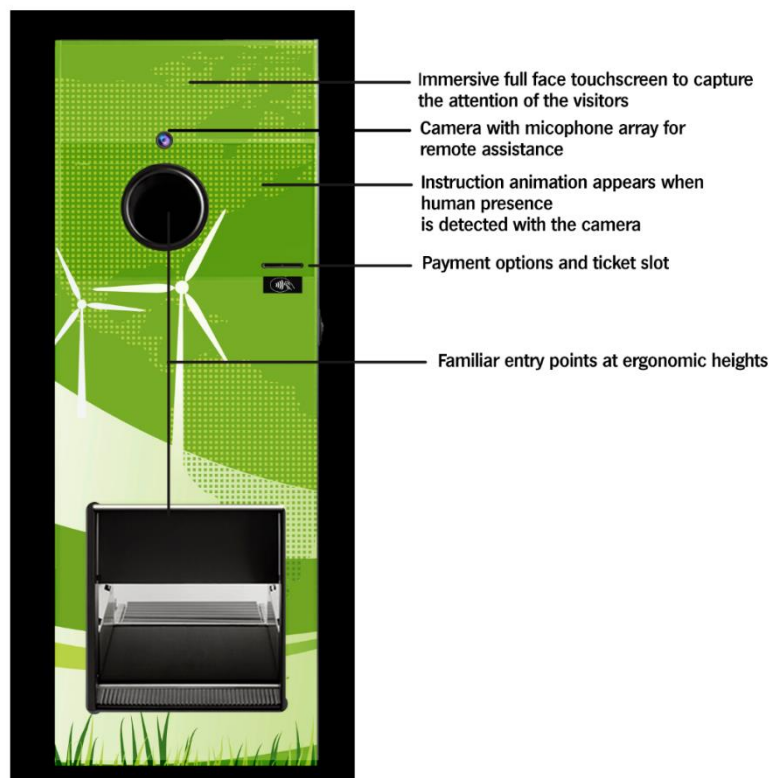


Figure 1 The interactive RVM interface design

As existing RVM's do not face these challenges (as critically) in their current applications, several subsystems/adjustments have been developed to solve the unique issues created by this cause. An interactive interface was created to increase the awareness of the service, allow for clear instructions to be displayed, and remote assistance if needed (as seen in Figure 1). A centralized ticketing system was created to possibly partner with existing RVM-holders and allow consumers to get their refund at different places so they are not locked into one service provider. Reducing maintenance was a key aspect so a cleaning solution was developed as well as a crate door to prevent the most basic form of abuse where a consumer could crawl through the machine. Another developed sub system with a huge impact on the feasibility of the Pickup Club concept is an automated way to stack crates. This solution allows for standard sized crates to be stacked automatically to reduce the footprint needed and allow for more storing capacity (as seen in Figure 2).

These and the other developed subsystems lead to the conclusion that the deposit packaging collection point is feasible for the Pickup Club concept (unstaffed and small locations), if the additional sub systems get implemented and the correct service partners get found to help with the nation-wide support coverage. As the system is ready for the new rules adding metal cans to the list of deposit packaging (planned December 2022 in the Netherlands) it is already future proof. Additional research could be done to include other (non-deposit) types of returns to be accepted (for example soda stream canisters and coffee cups) but has not been a part of this thesis. Furthermore some of the developed solutions also could be adapted to be implemented in the RVMs in grocery stores, as they could provide added value there, as less staff would be needed.

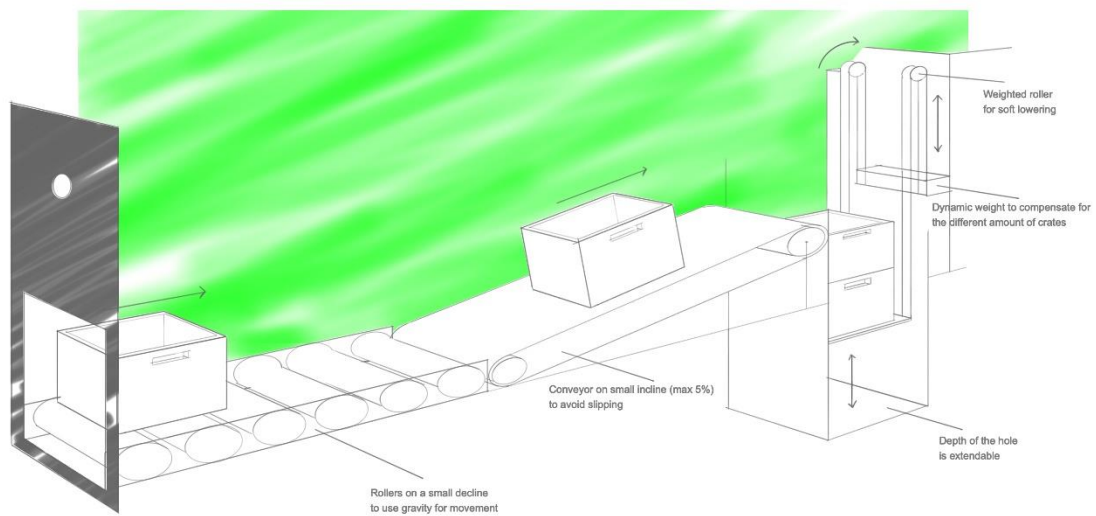


Figure 2 The crate stacking system design

References:

Bergsma, G. & Warringa, G. & Schep, E. (2017, August). “Kosten en effecten van statiegeld op kleine flesjes en blikjes” CE Delft.

Vogel, C. (2018, 22 Oktober). “Tankstations vaker onbemand: 'De concurrentie is moordend'

<https://www.rtinieuws.nl/economie/business/artikel/4459041/tankstation-onbemand-bemand-winkeltje-verdwijnt>