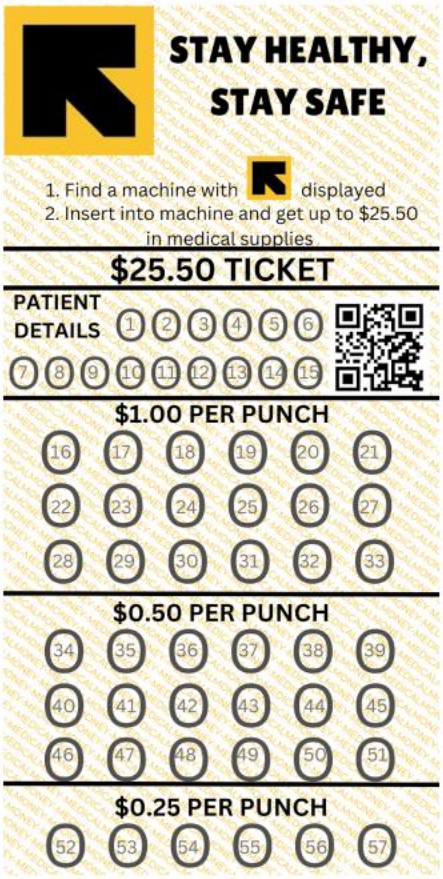
Attachment #1

L1: PhoneArena
https://www.phonearena.com/reviews/ipad-air-2024-review_id6036
L2 : Mayoclinic
https://www.mayoclinic.org/diseases-conditions/high-blood-pressure/expert-answers/wrist-blood-pressure-monitors/faq-20057802
L3 : A&D / Amazon
https://www.aandd.jp/products/manual/medical/ub543_en.pdf
https://www.amazon.com/Medical-Wrist-Pressure-Monitor-UB-543/dp/B00UB5EXNE
L4 : Microbattery
https://www.microbattery.com/blog/post/battery-bios:-everything-you-need-to-know-about-the-aaa-battery/
L5 : Energystar
https://www.energystar.gov/productfinder/product/certified-vending-machines/details/2360413
L6 : Starlink-Hardware
https://www.starlinkhardware.com/how-much-power-does-starlink-use/#Gen_3_Standard
L7 : Starlink
https://www.starlink.com/legal/documents/DOC-1400-28829-70
L8 : Hand-Crank-Generator/Electric-Pedals/Amazon
http://www.handcrankgenerator.com/400-watt-generators.html
https://www.electricpedals.com/hand-crank-generator
https://www.amazon.sg/Generator-Generation-Generators-Rehabilitation-Equipment/dp/B0C8GCS1W7
L9 : Utility-Smarts
https://www.utilitysmarts.com/renewables/solar-power/how-much-power-do-solar-panels-produce-per-square-meter/
L10 : Energystar
https://www.energystar.gov/productfinder/product/certified-commercial-refrigerators-and-freezers/details/2405451
L11 : Renogy-solar
https://www.renogy.com/200-watt-12-volt-monocrystalline-solar-panel/#op=%7B%22id%22%3A1718%2C%22options%22%3A%5B%7B%22optionId%22%3A%222639%22%2C%22value%22%3A%221818%22%7D%5D%7D
L12 : Renogy-battery
https://www.renogy.com/deep-cycle-agm-battery-12-volt-100ah/
L13 : Starlink-Colombia / Starlink-Insider
https://www.starlink.com/co/service-plans
https://starlinkinsider.com/starlink-price/
L14 : CableUK
https://www.cable.co.uk/mobiles/worldwide-data-pricing/
L15 : Salamander-fabs
https://salamanderfabs.com/sectors/kiosk-vending-and-enclosures/

L15 : Wired
https://es.wired.com/articulos/starlink-mini-llega-a-colombia-y-otros-paises-de-latinoamerica-precios-disponibilidad-y-lo-que-debes-saber
L16 : Everitt-vending
https://everittvending.sg/vending-machine-price-singapore/
L17 : LCF
https://lcf.com.sg/product/1-door-metal-locker-2/

Attachment #2

Punch-card example:



FEATURES:

1. UV-ink is used for the background watermarking as well as the qr-code. This is to prevent fraud via photocopying or altering of QR-codes.
2. The back of the Punch-Card lists all vending-machine locations as well as a list of most popular medications for sale.
3. A QR code can store 4296 characters (source: https://qrplanet.com/help/article/what-storage-capacity-does-a-qr-code-have). This allows us to encrypt information on what each 'punch' means in the patient details section. For example, punch 2 may represent 'diabetes' on one person's ticket but 'age less than 50' on another. This prevents anyone from comparing punch locations across different cards to deduce medical information, ensuring privacy. The vast capacity of QR codes ensures we can generate unique punch-cards without risk of duplication.
4. QR-code can store one-time special instructions to unlock the machine if the punch-card is specified to be supported on that specific machine, and it has never been used before
5. QR-code can store special instructions to not require the user to use the hand-crank generator. These specially encoded cards can be given to the disabled, frail or elderly.
6. All punches are slightly perforated to make it easier for the user to punch holes without a tool, but not too easy hence ensuring durability.
7. Unlike magnet-strip or contactless-chip cards, punch-cards are low-tech to reduce costs and make it easier for users to check their balance.

Attachment #3

Sample Vending machine

Features implemented:

1. Modularity: This allows us to retro-fit old machines or leverage existing designs in order to reduce costs and improve versatility.
2. Modularity also allows us to cut features we do not need to save costs or improve power-efficiency. For example, in sunnier areas with good wifi, we can replace the hand crank with additional battery capacity and replace the starlink panel with more solar panels.
3. Locations of nearby pharmacies and nearby machines are shown on a mini-map on the machine
4. The screen is not a touch-screen and uses a keypad in order to improve durability and reduce maintenance costs.
5. All medications are dispensed in black bags for privacy.
6. A wide variety of OTC medications such as cold, flu, fever, pain medications along with women's products are available so that onlookers cannot speculate what the user purchased.
7. Machine graphics lists all the available medications to attract users
8. Machine graphic reminds users to check that they got the correct medication to improve safety.
9. Machine only powers on when the user interacts with the machine and presses the keypad in order to conserve energy.
10. Solar panels on top of machine
11. Starlink standard gen 3 on top of the machine if wifi/cellular is not available.
12. BP (blood pressure) monitor and wrist cuff stored inside of a compartment at the side of the machine. When the user's BP is to be taken, they put it on the cuff and then the data is sent directly to VICN. They have no motivation to steal the cuff as it is only useful when connected to the machine.
13. The vending machine is not refrigerated in order to save costs. Instead, we remove the glass front and make it opaque to prevent the greenhouse effect from taking place, and further be able to add insulation to the front of the machine. We must also ensure that the medications stored can tolerate reasonable fluctuations in temperature throughout the day.
14. We may consider having smaller refrigerated areas to reduce energy consumption within the vending machines to store medications that are especially susceptible to temperature-induced degradation.
15. A non-transparent front prevents people from seeing how well-stocked a machine is, hence reducing likelihood of attempted break-ins.
16. Transparent materials are subconsciously associated with being brittle as compared to opaque materials hence, an opaque front gives a more robust impression.
17. wrist -cuff BP monitors are sufficiently accurate, but not as accurate as arm-cuffs. As a person's weight changes, the circumference of their arm changes to a greater degree as compared to the wrist. Hence, implementing a wrist cuff allows us to serve a larger user-base of different body proportions.
18. VICN features a high-capacity battery in order to store all the solar power collected.
19. Users can pay with credit-cards,cash,punch-card and local mobile payments

20. There is a reserved stock for Punch-card users in order to ensure that we focus mainly on our target market.
21. When a user uses a punch-card, their punch-card is remembered and a cooldown is placed on them preventing them from stockpiling a single type of medication. For example, if they buy 10 days worth of doses, they can only buy more a week from time of purchase.
22. VICN scans the punch-card and then instructs the user where to make a hole before scanning the punch-card to verify. This reduces the moving parts and improves reliability, maintenance costs.

Revised Vending Machine with VICN

Attachment #4

OLD VS NEW VENDING MACHINES

Attachment #5

Components	Benchmark Component	Immediate Cost per machine /USD	Monthly Operating Costs/USD	Links** + Comments
Vending machine	NIL	SGD 800-1200 = USD 618-927	USD 10 (This cost only applies when the machine breaks or there are faults. We assume it to be low since the machine has no refrigeration, water pipes, pumps or unnecessary moving parts.)	Finding exact quotes for simple vending machines is quite difficult since the per-unit cost depends on how many units the client is buying. A1L16 gives a range. We use the lower end of the range (USD 618) because Everitt is quoting a price for sale in Singapore and if we work with vending machine firms in developing countries we can get cheaper prices as the expected revenue from machines is lower because of the generally lower cost of living. We could consider using second-hand or refurbished machines in order to further reduce immediate costs but it may result in higher maintenance costs over the longer term.
BP-monitor	A&D UB543	42	0	A1L3. This is a benchmark product to estimate costs. The product we will use will just be the cuff with a wire leading into VICN and hence, be cheaper.
Network solution 1	Starlink Mini	A1L15 COP 800,000 =USD 189	COP 343,000*** = USD 81	A1L13. We went with mini instead of standard as it is cheaper and leaves more space for the solar panel.
Solar-panels	Renogy 200W panel	229(sale) or 289	0	A1L11. Operating costs are 0 since there is a 25-year 80% output warranty. The panel size is 149 cm by 70 cm which is relatively compact.
VICN chassis	1-door Metal cabinet	SGD 99 = USD 76		A1L17 quotes the price of a 1-door, tall metal cabinet. We can use this to estimate the cost of A1L15 sheet-metal fabrication to produce an enclosure for all the components.
Battery	Renogy 12V, 100Ah	219(sale) or 289	0	A1L12. This battery can store 1200Wh of power, enough for roughly 485 use-sessions.
Hand-crank generator	Amazon	340	0	A1L8.
Network solution 2	SIM-card data plans	0	Less than USD 10	A1L14. Developing countries have seen drastic fall in data-plan costs. In most of these countries you can get 1GB Data plans for less than USD10 per month
Miscellaneous	NIL	200	0	We add a buffer of 200 USD to account for wires, screws, qr-code readers and other components that are hard to plan in advance for.

** - For links see A1. Example: A1L15 represents the 15th link in A1.

***- Price varies from country-to-country. Developing countries mostly have lower prices but in this case, we went with Colombia.

Cost Analysis:

In remote areas without cellular connection, we need to include starlink into our costs, bringing immediate costs to roughly USD 1913 and recurring monthly costs (not including medication restocking costs) to USD 91. In areas with available cellular connection, we can further reduce expenses to an immediate cost of USD 1724 per machine and recurring monthly costs of roughly USD 20 per machine. It is important to note that in these calculations, we assume component costs to be towards the lower end of their respective ranges since we would be able to buy in bulk or get corporate pricing. We also do not include manufacturing costs and software development costs since without a finalised prototype, cost estimations can be greatly inaccurate.