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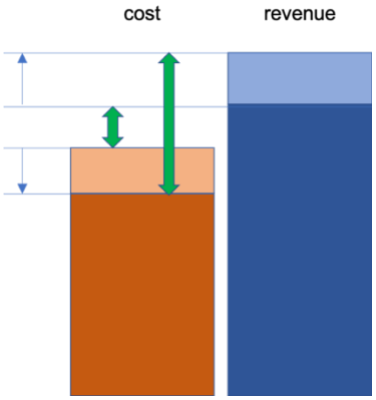
Ekkono Solutions AB

Show Me the Money – Business Models for Smart IoT

The technical definition of IoT, Internet of Things, is that we connect physical things to the Internet. We apply a bunch of sensors and actuators, and we connect them to retrieve that data and manage them remotely. This ability to have a relationship with your product after it leaves the factory, and even adjust it for its specific use, represents a tremendous business opportunity – if you do it right.

In general, there are two ways to make more money – *decrease cost* or *increase revenue*. In sales, 80% of the customer discussions are about the latter – new features, added values, and how to sell more products. But 80% of the purchase decision is on cost reduction. The reason is that it is far easier to calculate and justify return on investment (ROI) on known variables like cost than uncertain hypothesis of what a customer is willing to pay for a never-seen-before feature. But we obviously need both.



Let's approach this in a chronological order, from *production* through *installation*, *operations* and *product life-cycle*.

1.1 Production

In production the big benefit is on cost. Think a smart product that can configure itself *after* it has been deployed, to the environment in which it runs. For inventory this means that you need fewer, maybe only one, start configuration in stock. And you can spend less resources on fine-tuning and testing the product before it is being shipped.

Consider an automated guided vehicle that learns the surface, its typical load, normal hours of operations, and the ambient climate, depending on if it is sold to a warehouse in Härryda or a port in Mombasa. The key is 'learning at work' instead of trying to foresee how the specific vehicle will be used, and tune it *after* it has been deployed in its actual environment.

Edge machine learning* also enables cheaper parts. Learning per device means that the change, e.g. the difference in temperature between now and yesterday, is more important than the precise temperature down to the third decimal. Calibrated precision is more important when you are comparing between several units, like across your entire installed base. Learning for the individual device requires a less expensive sensor. Or even a virtual sensor† that calculates the sensor value using machine learning. Virtual sensors can be used instead of expensive or hard-to-deploy sensors, which decreases the cost of goods sold (COGS).

1.2 Installation

When the product arrives at customer premises, it is time for installation. A dream scenario is that the customer herself mounts it and then it self-configures. Like a thermostat that learns the climate, the presence and preferences of the residents, and adjusts the machine learning model accordingly. Or have the fuel injection test different acceleration sequences to best accommodate the specific vehicle and load. Again, this is a question of learning at work. It is like a Tamagotchi, where the more data you feed it the better it gets. And again, this is primarily a question of saving cost. But maybe this self-installation feature represents a way to up the image of the product, or even a value that can be charged for?

1.3 Operations

The big opportunity with smart IoT comes when the product is in operation. Predictive maintenance is the first case that most people think about with smart IoT. Proactive notifications when something needs attention, fewer unscheduled stops, enabling planned and synchronized maintenance, and pre-orders of the right spare and wear parts, without shipping express. These are cost-savings for the customer, which means a revenue-opportunity for the vendor. This can be sold as an add-on, as an SLA (service level agreement) or even as-a-service.

Smart IoT also offers other values when in operation. Automated fine-tuning for performance optimization reduces fuel or energy consumption. Products become more intuitive, which saves operator time and comes with an innovative image and a premium price. Insights that can be valuable to "your neighbor", like a change detector on the pressure of a water pump telling the machine that a pipe is getting clogged or that a gasket is about to leak.

1.4 Product Life-Cycle

Lastly, we have the product life-cycle, where you either retire a product, upgrade it, or scale up with another unit. Smart products will have extended life-length by avoiding harming break-downs through proactive maintenance, and less wear due to being optimally run. And imagine being able

* Edge Machine Learning means running machine learning (ML) at the edge of the network – onboard the connected device. Ekkono develops an Edge Machine Learning software. In Ekkono's case, it is possible to do incremental learning at the edge, which means that the ML model continuously gets better but also that it gets personalized as it is fed with sensor data while in production.
† Virtual Sensors are covered separately in #openfika number 4.

to bring all the Tamagotchi-learnings with you from your old to your new unit, or use it out of the gate when launching a second or a third unit.

I want my robot lawn mower to learn *my* garden, not *a* garden – when and where to run for the best result, and avoid getting stuck. Being able to transfer what it has learnt about my garden during thousands of hours of operations makes me brand loyal when I'm buying a new mower that instantly can run at optimum. Or maybe I can be convinced to buy their automated watering system as the robot mower becomes my "digital gardener", telling the watering system where and when sectors of my garden will go dry. I'm quite sure there are similarities with truck owners buying another truck, and when selling mining or construction equipment, or even kitchens.

Product life-cycle is also about *selling* or *providing*. Many companies strive towards a more service-centric business model, moving away from the traditional one-off, transaction-based, product-centric business model. A service-centric business model enables sharing, but you can also go as far as "pay per use" – charge per liter of pumped water, per driven mile, or per moved ton. A big difference between the service- and the product-centric business model is that you move the asset to your balance sheet; Suddenly the total product life cost becomes more relevant than the production cost. And of course, none of this is possible without IoT – and the business case is ruined without the automation of Smart IoT.

2 Sustainability

Extended product life, lower energy consumption, not sending maintenance engineers and spare parts by express across the globe, and offering customers in both developed and developing countries the same expertise, is perfectly in line with UN's Agenda 2030 goals for sustainable development. These sustainability benefits used to be nice to have, but today you must have a sustainability strategy.

Smart IoT addresses all of the above and Edge Machine Learning represents the next big sustainability opportunity for vendors of physical products. In your production you design a generic product that is as energy efficient as possible; The next big gain comes from optimizing how each individual unit runs – in its local environment and for its specific purpose. Like an air conditioner (AC) that should be tuned differently in the summer versus winter, if it is installed in Stockholm or Seville, and if the door is open to the tropics outside.

3 Conclusions

When looking at the business case for automation, the product OEMs' domain expertise is crucial. While some features are seen as revolutionary in one industry, they might be the benchmark in another, or a way to gain customer loyalty in a third, and a competitive advantage that puts you on top in a fourth. But it all starts and ends with identifying real problems to solve, and conclude what value that solution offers. Offering value is always a good starting point for doing business.

On the cost side, automation is a lot about saving on labor/time. Smart IoT substitutes plenty of routine and low-level work, while enabling your experts to spend their time on solving the real problems with relevant input at their hands. But you also find savings on inventory, wear parts, component cost and, communication cost.

- It never starts with technology or data
  - Find real problems
  - Quantify the value
  - Build the business case – how and who will sell it?
- Think Tamagotchi – 'Learning at work' from sensor data rather than programming everything before the product leaves the factory
- IoT is not about connecting things – ***it's about connecting <u>smart</u> things!***

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Ekkono #openfika is a short open, online fika‡ session, hosted by Ekkono, on hot, contemporary and relevant topics, where a 15 minutes presentation is followed by discussion and Q&A. Keep an eye on www.ekkono.ai and LinkedIn for the next #openfika session.

Ekkono Solutions AB is a software company that develops Edge Machine Learning. Our product is the result of seven years of research at the University of Borås, Sweden, and assists product OEMs in different industries to rapidly develop smart features onboard their products, using machine learning to make them self-learning and predictive. For more information, visit www.ekkono.ai.

‡ fika (wikipedia.org); Swedes have fika (pronounced ['fiːka]), meaning "coffee break". The tradition has spread throughout Swedish businesses around the world. Fika is a social institution in Sweden and a common practice at workplaces in Sweden. Fika may also function partially as an informal meeting between co-workers and management people, and it may even be considered impolite not to join in.