CORPORATE ENTREPRENEURSHIP & DESIGN

A?

hoogendoorn growth management

HARVESTING DESIGN STRATEGIES

iFarm

Anna - Anniina - Rohan - Tomi - Tuukka

Contents

TEAM MEMBERS

Anna Luhtakanta 724153
Anniina Leggat 288424
Rohan Sachdeva 912512
Tomi Nieminen 492676
Tuukka Rissanen 439448

1. Introduction

This report is the outcome of our group project in the course Corporate Entrepreneurship and Design. Our task was to study two companies, out of which one should be a newly founded startup and the other an established larger company, and then compare their design approaches. Our focus with this assignment has been looking into the value of design, what kind of evidence there is of design in our case companies, and what could be done to enhance the value of design in these companies.

We chose to analyse two companies with a highly technological orientation to horticultural systems. These companies are Hoogendoorn and iFarm. Hoogendoorn is a Dutch-based global horticultural company offering large-scale solutions for industrial farmers depending on their needs. Hoogendoorn was established in 1967 and in 1974 they introduced the world's first horticultural computer-aided farming system. iFarm is a Russian/Finnish based startup founded in 2017 focusing on fully automated vertical farming systems. In the year 2020 iFarm has raised a total 5 million euros in funding. Whereas Hoogendoorn is targeting their offerings only on industrial farmers, iFarm is aiming to extend their offerings to households, supermarkets and restaurants as well.

Before describing our case companies in more depth, we will take a short look into the current challenges and developments that are taking place in the horticultural industry as well as introduce vertical farming as a one approach of emerging horticultural practices. After the industry overview, vertical farming and company introductions, we will move forward to the actual analysis of the design approaches in our case companies. We have framed our design analysis mostly with two frameworks: Effectuation and Danish Design Ladder. These frameworks are going to be elaborated before applying them into the company comparison. At the end of our report, we're going to propose our recommendations for our case companies about how they could advance their design orientation for greater value creation.

2. Industry Overview

2.1. Overview of the current state of global food production

Global food production, like so many other industries, are facing great challenges and changes in the environmental and social circumstances of the contemporary world. The main challenge of food production is to cater the more or less excessive needs of the growing population while staying within the bounds of our planetary resources. Sustainable alignment in food production is especially important in the development of the horticultural industry.

There are numerous megatrends and unsustainable tensions touching upon horticulture that are going to be harmful to people and the planet if not addressed properly. Climate change is causing unpredictable environmental conditions for food production and land is degrading in many places around the world. The rural areas are becoming less able to provide employment and more and more people are moving to cities to find better employment. The Finnish Innovation Fund Sitra (2018) has predicted that by 2050 70% of people will live in the cities. In addition to the trend of urbanization, there's a growing number of people in the world who are going to inhabit those cities. The UN (population.un.org 2020) has predicted the global population to exceed 10 billion before 2060. In addition, world hunger is still a serious issue around the world: according to the UN (2020), 8.9 percent of the world's population (690 million people) are suffering from hunger, and that has been a growing number since 2015.

"A profound change of the global food and agriculture system is needed if we are to nourish the more than 690 million people who are hungry today – and the additional 2 billion people the world will have by 2050"

- UN's Sustainable Development Goal #2: Zero Hunger (UN 2020)

Considering these current global developments and potential conflicts, we are in a great need for new innovative solutions for global food production which would still remain in the limits of our terrestrial resources. The latest advancements in greentech can potentially provide solutions to these global issues we are facing. The horticultural industry is currently resolving these issues with highly technological solutions. The industry is developing more and more into data-driven farming, artificially automated farming environments and vertical farming, which enables, for example, farming in urban areas. The common trend in the industry is to maximize the quality and quantity of crops while at the same time decrease the needed amount of chemicals, water, labour and other resources.

2.2. Vertical Farming

The other one of our case companies is mainly focusing on vertical farming solutions so it's appropriate to examine that topic a little deeper. That also serves in our discussion as a one particular example of contemporary, highly technological farming practice.

Vertical farming is a form of horticulture in which the crops are grown in vertically stacked layers or vertical surfaces. Modern vertical farming includes the controlling, and even automation, of environmental factors such as (artificial) light, humidity, temperature and fertilization. Vertical farming is combined with farming techniques like water-based farming techniques (such as hydroponics or aeroponics) that do not require soil for the plants. Vertical farming is promised to use 90% less water and 75% less fertilisers without a need for pesticides, when compared to traditional farming (ifarm.fi/about 2020).

Vertical farming is gaining popularity as it provides year-round fresh, locally produced food independent of climate or location. Taking into account the global trend of urbanization, vertical farming enables farming in large cities as it needs less land area and construction activity. Vertical farming optimizes the available space while reducing the need for time- and energy-consuming logistics. This way, the growing number of people that are living in the cities can get access to fresh and locally produced food. Vertical farming is also less dependent on weather conditions, land degradation and pests as the indoor environment is controlled with automation technology.

The main problem of vertical farming is its high need of energy and special equipment which makes it quite an expensive way to farm food. Unlike greenhouses, vertical indoor farming doesn't benefit natural growth factors such as sunlight or wind, but they have to be managed technologically instead. Vertical farming's grade of ecological sustainability is strongly defined by the source of energy that is used in a farm. Currently vertical farming is suitable only on small crops, like salads, herbs, and berries but the technologies are suspected to develop along the industry.

Because of its urban possibilities and independence from weather conditions, the industry of vertical farming is expected to grow in the near future. Global markets of vertical farming have been predicted to grow 350% from 2019 to 2025, from 4.4 billion USD to 15.7 billion USD. (Shahbandeh 2020).

3. Company cases

3.1. Hoogendoorn

Hoogendoorn is a horticultural automation company founded in 1967 (Hoogendoorn, 2020). They are specialised in different automation solutions for farming which help produce high-quality crops by using fewer chemical inputs, resources and labor. Their goal is to be a forerunner in data-driven and automated growing.

They started as a technical installation company and in 1974 Hoogendoorn brought the first digital horticultural computer to the market. Their aim ever since has been to create sustainable and efficient solutions by leveraging technology, data and automation. All of their products are modular and can be customized to the customer's needs. Managing and controlling the greenhouse environment, not only does it reduce the needed resources, but also reduces plant diseases and insects.

Their latest product was recently launched -- IIVO new flagship created based on previous generation's iSii product family and user collaboration. IIVO utilises Plant Empowerment and Data-driven Growing. Based on the interview we had with the company, their next step would go towards fully automated growing which includes robots reducing labor work (e.g. harvesting) needed inside the greenhouse.

Hoogendoorn headquarters is located in the Netherlands and has branches in 4 different countries (France, Asia/China, Latin America/Mexico, Canada). Although their business model is B2B, where Hoogendoorn provides their products through partners worldwide and these partners are the first contact point to the farmers, Hoogendoorn also has contact with the end users after the purchase in forms of training, support or software updates.

Their development process utilises Agile methods and the products are developed in close cooperation with the end users, partners, and universities. 15% of the revenue goes to R&D and their products have state-of-the-art-technology and hardware and produced according to international quality standards. Recently Hoogendoorn partook and won Wageningen University's Autonomous Greenhouse Challenge. In this hackathon the team grew 6 months tomatoes fully remotely using AI with huge success.

3.2. iFarm

Farm is an indoor farming solution provider of plug&play, year-round automated vertical farms and data-driven software. The idea for iFarm started when the founder returned to Siberian from Europe, and he couldn't get any fresh products during that season. So he decided to change things by producing modern technologies for city farming in order to improve the affordable and quality products regardless of the environment. This resulted in iFarm being founded in 2017 in Helsinki. Since then, iFarm has raised $1 million in early 2019 and $4 million more in a second round in 2020.

iFarm's offers a range of farming solutions which all are utilizing their Growtune software. With the software, farming is done fully autonomously and there is a possibility to simulate different climates depending on which crops are currently being farmed.

The solutions are currently sold mainly in the B2B market where the main customers are restaurants, supermarkets, and farmers; basically anyone who practises farming at some level. However, there has been, especially due to the Covid-19 pandemic, more demand for solutions which enable farming in individual households or smaller communities.

To conclude, iFarm is following their basic principle of providing farming for everyone, everywhere. The hardware combined with the Growtune software creates a fully automated farming setting, where the user only has to plant the seed. In addition, iFarm's products enable farming in urban settings, providing restaurants, farmers and supermarkets to provide their customers with truly locally farmed crops. In addition, the solutions enable people to farm their own crops in their apartments, which could be the trend in the future.

3.3. Tools for the Comparative Study

To study our case companies' design approaches to entrepreneurial action, we have mainly employed two frameworks: Effectuation and Danish Design Ladder. Effectuation and it's principles will give us more insights on how our case companies leverage design as a process inside the companies. We found this framework to be a good fit after doing the research on the companies: there were many interesting touchpoints that demonstrated the purpose of this study well. Danish Design Ladder was chosen for pointing out the concrete level of utilised design within the companies as well as a step for further analysis.

We will next proceed to discuss more about Effectuation and then use the principles it provides in our first company comparison. After that, in chapter 5, we will delve deeper into the Danish Design Ladder by looking into how the case companies have approached their product development so far. We will then position the companies on the ladder which will provide a basis for further discussion as well.

Visit at to the iFarm 6.10.2020

4. Comparison 1 : Effectuation

4.1. Effectuation in general

Effectuation is an entrepreneurial process and way of reasoning that has been originally developed by Saras Sarasvathy. Effectuation is based on reasoning that focuses on no specific goal in the beginning of the entrepreneurial process but the goal emerges over time when the entrepreneur starts working with the given set of means and interacts with the world and other people (Sarasvathy 2001). So the given set of means are used to define the goals. Effectual thinkers basically don't believe in predicting the future but instead aim to control the current circumstances in order to drive the desired future.

Effectuation consists of five principle

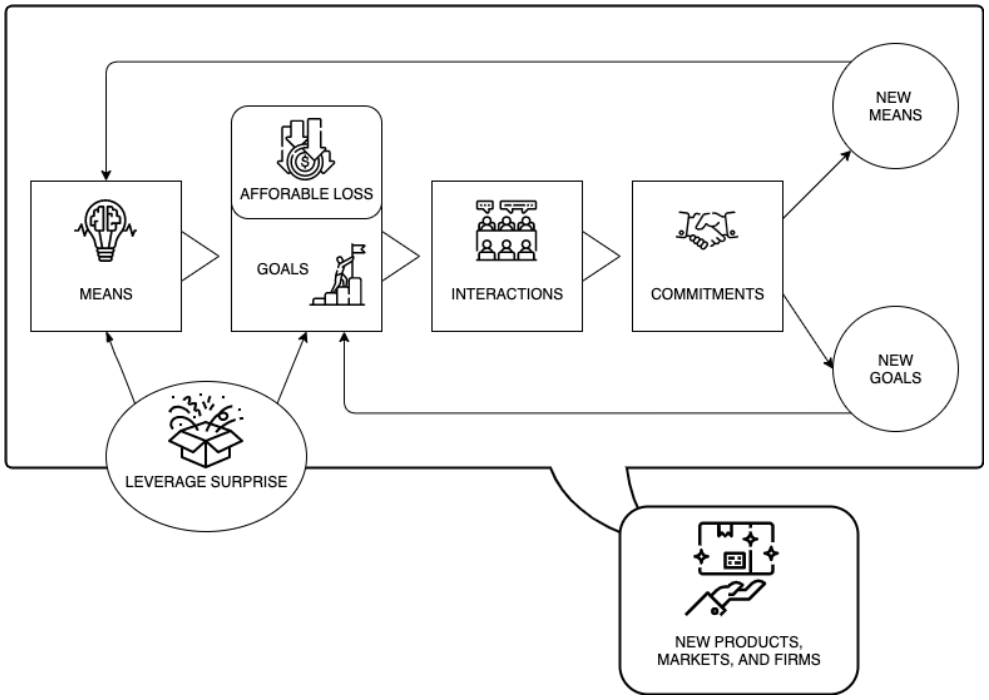
I. **Start with your means (Bird in Hand Principle):**
Effectual entrepreneurs begin where they are by finding opportunities from who they are (eg traits and abilities), what they know (eg.education) and who they know (social networks).

II. **Affordable Loss Principle:**
Instead of targeting the market segments with highest return predictions, effectual reasoning aims to reach the markets with as little investment of resources as possible. That often means trying to sell the product or a prototype as soon as possible to get some immediate feedback from the markets. If the product isn't interesting enough, then the minimum effort is the affordable loss.

III. **Leveraging Contingencies (Lemonade Principle):**
Instead of avoiding surprises effectual reasoning tends to leverage the contingencies it faces by learning, growing and adapting as they appear. Thus the effectual outcomes are the results of the interaction between the given means and the specific environment it is growing in.

IV. **Form partnerships (Crazy-Quilt Principle):**
Instead of systematic competitive analysis effectual reasoning has a focus on building strategic partnerships and in that way reduces the level of uncertainty included in creating a new venture.

V. **Control the controllable (Pilot in the Plane Principle):** Effectual reasoning has an assumption about the future that you really cannot predict it very well but you can work to make it happen. In a logic of effectual reasoning unpredictability is actually a good thing since you can have more control over it by your actions and there's less people trying it out.



Effectual cycle (Sarasvathy, 2011)

First steps of the cycle
The entrepreneur begins with an inventory of his means, which leads to the goals. The goals chosen for further development are something within affordable loss. Regardless if the idea sprouts any results, the losses are minimized already.

Second steps of the cycle
Interactions drive stakeholders to interact more with the new venture and involve the original idea into one that a whole network is committed to.

This cycle continues as the effectual entrepreneur grows closer to a refined final product, complete with committed customers and stakeholders forming the new market.

4.3. Effectuation as a framework for company comparison

4.3.1. Bird in hand - Start with your means

HOOGENDOORN

This principle provides perhaps an obvious starting point for our comparison. Although, it might not be the most useful for our case studies as both of our companies have already started their ventures and are operating. **Hoogendoorn**, especially, has been successfully operated for over 50 years. Hoogendoorn's country of origin, The Netherlands, has provided a fertile environment for the horticultural industry to grow, springing many international horticultural companies. Hoogendoorn is one of them and has surely been one to benefit from Dutch horticultural ecosystem and network. They also are a subsidiary of Batenburg group, and are, thus, enjoying large corporate resources as well as control as their starting means. For better or worse, this affects their abilities for further innovation.

iFarm

An interesting story is the beginning of the idea behind **iFarm**. iFarm started as a Siberian possibility to grow local food independent of the climate and environment. This evolved to a vision that farming crops should be done despite one's background: with iFarm's system anyone can farm, even without prior experience in farming. Interestingly, this idea is strongly driven by iFarm's Growtune software. So rather than focusing on the aspects of farming, iFarm disrupts the traditional industry with their software product. In that sense, iFarm is clearly focusing on their means of changing the way farming is done and doing that through the excessive use of modern technology; providing a completely different approach in the conservative industry of farming.

In addition, iFarm's clear goal is directing their R&D and other processes. It is a case in point how stating a clear goal which the company aims to achieve can indeed help the entrepreneurs to take appropriate action. For instance, their product called Cropper which was produced due to the demand for more convenient ways of farming crops at home. In other words, in this example, the goal of providing legitimate farming solutions for individual people actually directed the whole product development process.

4.3.2. Affordable Loss - Set affordable loss

HOOGENDOORN

Hoogendoorn developed their new flagship product, IIVO, for two years in the field before launching it by using an agile software development process. This was preceded by eight years of developing similar offerings, which one could interpret as previous generations of IIVO. This development process implies an organizational focus on incremental innovation of the core element of Hoogendoorn's business, that is optimizing existing products for existing customers (Nagji and Tuff 2012). The principle of affordable loss is, however, more about testing new ideas in an affordable manner to gain market feedback. This doesn't seem to fit Hoogendoorn's approach.

Hoogendoorn is growing into the same direction as the industry in general and to accomplish that objective, they must compete to keep and grow their position in the global market of data-driven horticulture. This is often common in established companies. But the more technologically oriented the industry becomes, the more companies should focus on disruptive and transformational innovation. For example, for a mid-stage technology company, Nagji and Tuff (2012) suggest a ratio of 45% focus on core innovation, 40% focus on adjacent innovation (i.e. expanding company business area) and 15% on transformational innovation (i.e. inventing for markets that don't yet exist).

iFarm

iFarm is having multiple directions at the same time. They aim to provide solutions for different audiences: farmers, companies, HoReCa and individual households. It could be seen that iFarms aims to keep as many doors open as possible; at least in terms of the customer segments. In other words, whichever trend is in the future in terms of farming and growing crops, iFarm should be able to match that need with their solutions.

There is, however, the question of shareholder effect on the operations and especially, how the investors are affecting the directions the company takes. This might be the case in many startups where investors outside the original founders have been brought in. In iFarm's case, there is a focus to increase the yield per square meter in the test plantations; meaning that each square meter would produce more crops in the future. Therefore, it should be taken into account that the investors involved are considering the company as an investment, seeking measurable outcomes of the R&D processes. On the other hand, this kind of a measurable goal balances the company's long term vision of transforming farming.

4.3.3. Lemonade - Leverage Contingencies

To study the effectuation principle of leveraging contingencies, we focused on the effect of Covid-19 pandemic to our case companies and how they handled it.

iFarm got new product/business opportunities out of Covid-situation, which is a good example of leveraging the contingencies-principle. They got the idea of creating from shipping containers modules of ready-to-use indoor farms and in that way scaling the modularity of their offering. In addition, especially local food and producing food at home is trending. People are preferring food items which are produced nearby, which will provide more demand for iFarm's offering.

In addition, legislative changes can provide new opportunities. As some countries and some individual states in the US have legalized cannabis, many people are now interested in setting up home growing infrastructure. Even though cannabis has not been iFarm's focus, changes in legislation provided them with a new type of customer segment. Hoogendoorn as a Dutch firm has already for some time been working with partners who are farming medical cannabis but are focusing more on large scale farms. That kind of head start can prove to be valuable in a larger scale change in legislation.

In the midst of the global pandemic, one of the biggest trends among consumers is to prefer locally produced food. People consider local food to be logistically more efficient, reducing emissions and requiring less additives. In terms of this trend, iFarm's solution fits perfectly to the scene. With iFarm's solutions grocery stores are capable of farming their own crops. This has already been done in some supermarkets in Moscow. Moreover, the farmers can move closer to the consumers since with iFarm's setup farming can be done in urban environments.

Hoogendoorn lost a lot of money in the first three months of Covid-pandemic but then they earned everything back in one month. They more of survived Covid than actually leveraged it. It just happened to them as it happened to everyone else and there wasn't any specific reaction to leverage the new situation. Although it could have gone worse. They were able to consolidate their position in the face of crisis by relying on their partnerships around the globe.

4.3.5. Crazy Quilt: Partnerships

HOOGENDOORN

Big part of **Hoogendoorn's** business model, and especially its global scope, is based on effective partnerships. They are actively seeking and validating potential partners abroad to join their venture and with new partners they are able to expand their business to new countries. They have an impressive global network of partnerships which are crucial to their business, and are thus a good example of the importance of partnership in growing successful business.

Hoogendoorn’s partners on the map
(Hoogendoorn website 2020)

iFarm

iFarm is really open for different kinds of partnerships and considers their competition as possible partners as well. Since iFarm’s product focus is on the software, they do not want to see other companies providing farming solutions as competitors. iFarm aims to position themselves as a company that helps farming for anyone anywhere, hence there is no point to facilitate competition. In other words, no matter who is doing the farming is a potential customer and other farming related services are potential collaborations.

In addition, as iFarm states, other farming related software in the market are for different kinds of purposes, hence there does not really exist any actual competitors for them in the first place. They look out for synergies between different players in the field. One example is iFarm´s collaboration with Moomin characters.

4.3.6. Pilot in the plane: Control what you can control

The pilot in the plane principle conceals the idea that rather than predicting the future, the future should be created. Regarding iFarm, their business strongly suggests that the company is truly creating the future in terms of farming. To elaborate, anyone with basic understanding of the world we live in knows that the food production is going to change radically in the near future. The problem, however, that no one has the exact answers to the questions of how and what is changing.

Based on our research iFarm is not really trying to predict the future. Rather their approach is to understand and accept the changes in food production but still have their own vision of its future. They have a strong software tool enabling farming without the resource heavy infrastructure which is needed in traditional farming settings. In other words, they have a strong control of the software and its potential but they keep the doors open in terms of the changes in the market; the key is to enable farming for anyone, but there is no point in predicting who is doing the farming.

To conclude, iFarm has done a clever job in designing the products so that they are not really targeted to any specific customer segment. This enables the product to be sold and offered to a wide range of customers from individuals to farmers. This relates quite much to the affordable loss principle as well, since iFarm can experiment with multiple segments at the same time with the same product portfolio.

4.4. Conclusion on Effectuation

Through the lenses of Effectuation, we have seen that iFarm as a newly founded company has realized the idea of effectuation much more thoroughly than its corporate colleague Hoogendoorn. This is especially seen in their attitude towards the future of the industry; they're creating a new possibility to organize food production. In order to do that, they're pretty much open to every direction considering their customers and partnerships. iFarm also seemed to be more proactive in the face of corona-pandemic.

Hoogendoorn's approach is much more straight-forward development of their core product along the lines of general industry development. Whereas iFarm is more about creating their future vision, Hoogendoorn seems to bet more on the likely predictions of the future of the industry. One of their strongest assets, at least from the point of view of effectuation, is their broad network of partnerships, which they strongly rely on when scaling their business operations.

It might also be on point to discuss, that perhaps it's not even appropriate for Hoogendoorn to expand into a riskier side of the industry, but instead to focus on what they are already excelling at and have a stable market position. Why divide the focus when it seems to work well for them? This playing safe, however, might put them in a risk from a long-term view as smaller players, like iFarm, are constantly working to change the paradigm. It can suddenly prove to be a declining path to be a market leader in a disrupted and obsolete field of business. That is what corporate entrepreneurship is pretty much about: finding ways to renew the business in the times of change.

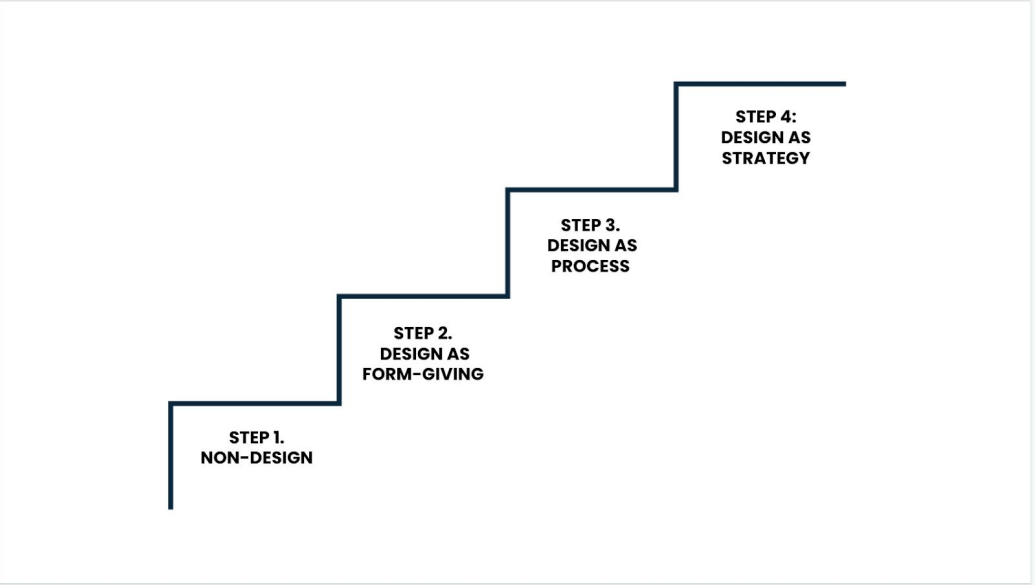
This analytical comparison of effectual principles in our case companies provides a foundation for further analysis of the value of design in the case companies. We have now compared the entrepreneurial mindset in these companies through the lenses of Effectuation. Next we will take a closer look at the past product development in the companies to get more understanding about the context of how they are using design in their product development processes. To support our examination of the role of design, we will use the Danish Design Ladder framework.

5. Comparison 2: Role of Design

5.1. The Design Ladder

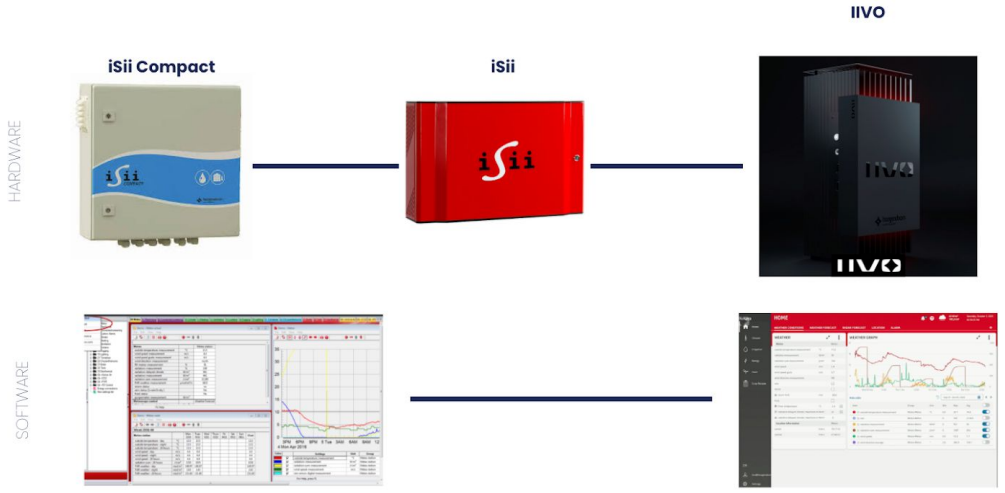
The Design Ladder was developed by the Danish Design Centre in 2001 as a communicative model for illustrating the variation in companies' use of design. The Design Ladder is based on the hypothesis that there is a positive link between higher earnings, placing a greater emphasis on design methods in the early stages of development and giving design a more strategic position in the company's overall business strategy (Dansk Design Center, 2020).

In this chapter we shall analyze the positioning of the two case companies on the ladder based on the evidence gathered during interviews, site visits and background research.



5.1.1. Hoogendoorn Growth Management

The design strategy at Hoogendoorn places them on the second step of the Danish Design Ladder. On this second step of *design as form-giving*, companies utilise design as a means to develop the form, usability and aesthetics of a product (Doherty et al., 2014). At Hoogendoorn, design is understood to be valuable in building and communicating the brand. In the development of their software systems, user needs are considered and they have used external UI/UX consulting to develop the user interface.

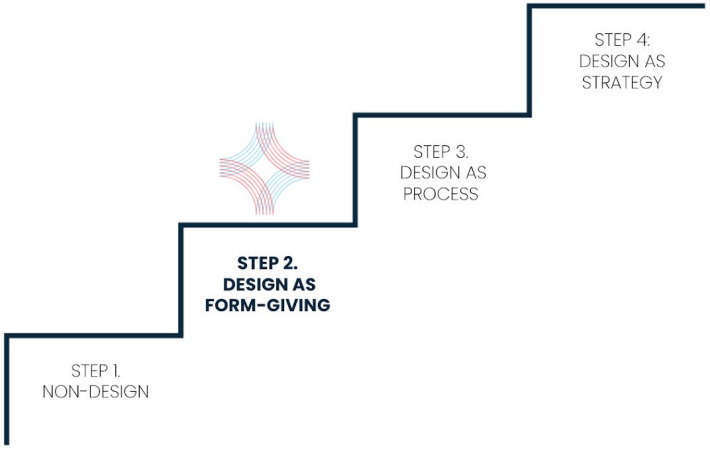


When the strategy of design is form-giving, design outcomes can be easily measured as they are generally evident in new products or product features. (Doherty et al., 2014). This effect can be observed in the new flagship product of Hoogendoorn, the IIVO system, that was launched on 8th of October 2020. Compared to its predecessor, the iiSi computer, the IIVO process computer stands apart from Hoogendoorn's earlier design language with it´s black metal casing and red led lighting.

When asked about the reasoning of the new aesthetic Angela Barendregt, project manager of international business & strategy, said that :

> *“ This is standard industrial hardware, but we decided to design this standard industrial hardware in another casing - with LED lights on top and IIVO logo. because if you are in a greenhouse and other grower is coming into the greenhouse as well and that grower doesn't have an IIVO, but a for example a Priva computer (a competing product), and they are looking at the IIVO an they are wondering how does this computer works - It's looking so premium. So it's a part of your brand image in your marketing strategy to have hardware designed based on the IIVO”*

At Hoogendoorn, the product design is motivated by the need of brand recognition; with that the aim of communicating for example bespoke nature of IIVO systems.



Design Process at Hoogendoorn

The design process at Hoogendoorn is linear and incremental in general, where the new products progress from the success of older solutions. Innovation happened on the product system level, for example the IIVO system was developed from ground developing the software in-house.

The software development follows the modern workflow of agile software development. This allows faster development sycless The design process is influenced by the needs of Hoogendoorn´s end-users, the farmers, and new features are added based on their input.

5.1.2. iFarm

iFarms vision is to enable everyone to be a farmer, even without any prior knowledge.

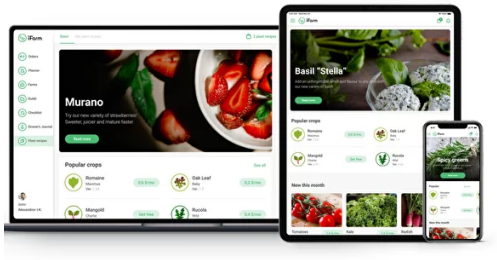
iFarm´s product is the iFarm Growtune growth management software and the vertical farms themselves. They provide a service for new farmers planning the new indoor farm in a process they call the “design process”. The outcome of this process are the blueprints and calculations of the productions of the new farm. After the initial planning face the farmer can choose to either purchase the farm equipment (the vertical platforms, irrigation system, AC unit etc.) either directly from iFarm or from a third party. iFarm will then help the farmer to construct the farm, set up the various sensors and train the user to use the management app.

After this the grower can follow the plan recipes provided by the software to plan & manage their production.

iFarm´s Customer

iFarm´s customers are the growers themselves - whether a small or industrial scale. The indoor farming allows total control of the growing environment - every variable is known and can be controlled. This enables the system to be highly automated and predictable.

iFarm´s Products

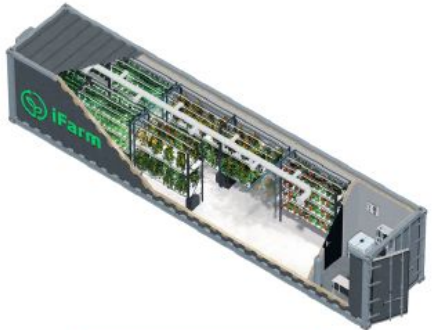


iFarm Growtune
Growth management software. Application that enables the farmers to manage their vertical farms; plan and monitor the production and many other functions, e.g automatically calculate the end price of the produced products based on the library of recommended and seasonal prices

Indoor Vertical Farm
iFarm Vertical Farm is a modular factory for urban indoor vertical farming. The Vertical Farm solution allows a completely controllable environment and farming without any use of pesticides & herbicides.
iFarm provides a service of plans and equipment to set up the indoor farm. They also have a few custom equipment, for example a LED light, that they manufacture themselves.

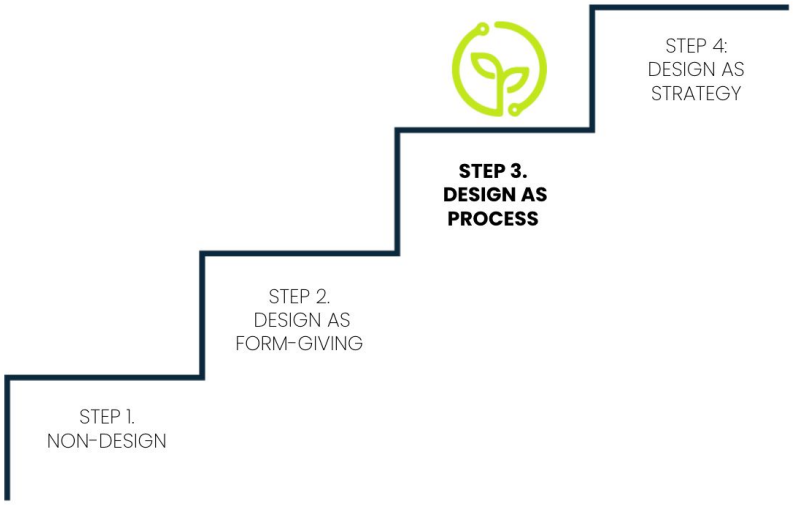
These fully automated farming units can be built in urban areas (can be implemented in warehouses, basements, etc.)

iFarm Cropper
Unit for used in consumer / domestic setting,
eg. restaurants, shops and homes.



iFarm Container
(under development)
Self-contained farm with built in vertical farm with controlled lighting, air conditioning and irrigation. Needs to plug into the utilities (water & electricity)- Could come with year´s supplies.

iFarms Position on the Design Ladder



Based on our analysis, we believe that iFarm is situated on the third step of the design ladder, where design is applied on the process level. The third step, ‘Design as Process’, is achieved when companies are able to apply design as a methodology, rather than a tool, within projects. The design process can be adapted to the task and involves a strong consideration of stakeholder requirements (Doherty et al., 2014).

iFarm has a very adaptive development process, where new complementary product opportunities are explored, tethered to the core product which is the iFarm Growtune software. The new customer and industry-targeted products are all design with thE main principle making the system as simple to use as possible - a turn key solution to automated farming.

6. Next steps

6.1 Hoogendoorn

6.1.1 Experiment with disruptive and transformational innovation.

Hoogendoorn is growing into the same direction as the industry in general but due to the shift during the recent years Hoogendoorn has to work predictively to accomplish that objective, they must compete to keep up and grow their position in the global market of data-driven horticulture. This is often common in established companies. But the more technologically oriented the industry becomes, the more companies should focus on disruptive and transformational innovation.

Our suggestion is that Hoogendoorn could add design as early as the development process and turn towards a disruptive and transformational innovation attitude. Rather than using Design as a form giving and aesthetic function, It can be utilised for early and creative concept development to innovate new breakthroughs in the horticulture industry. They should also be leveraging their wide networks around the globe.

6.1.2 Transparent communication and network creation.

We have also noted that Hoogendoorn is quite stealth in it's ways of operating, not only to its competition or the industry but to its users and patrons as well. The launch of IIVO was not predicted by a lot of Hoogendorn's own users who ended up buying the earlier version isii just a week before the launch.

This leads us to suggest that it might be useful to be more open in communications in order to create surprising connections and collaborations. They could do this by having a more transparent structure and collaborating with their competitions to create meaningful and beneficial partnerships which benefit both the companies. They could leverage their global community by, for example, providing open innovation opportunities among their partners. This open innovation type of possibility could include their customers as well.

6.1.3 Bring users closer by creating a platform.

Hoogendoorn can create a platform for farmers, who can discuss their autonomous farms, share recipes, discuss pain points and answer general questions. Using this opportunity Hoogendoorn would be able to create an ecosystem for the farmers and have a community based approach to growing. They can also potentially open an API (Application programming interface) for further software development.

6.2 iFarm

6.2.1 Developing turnkey solution

iFarm would benefit from adopting design on a strategic level, for example in their internal development projects. This could potentially lead to a turnkey solution, where the buying of the solution would be as easy as possible for the customer.

In other words, at the moment there is a danger of contradiction. As the products of iFarm enable farming to be done fully automated, the purchasing of the products should be so as well: when the customer purchases iFarm products, they should be dispatched and installed as a one turnkey solution. This would help their sales processes as well and help the customer to understand what they are buying.

6.2.2 Development of the container unit

The self-contained shipping container units have great potential for further development by acting as a self-sufficient growing solution, Utilizing this solution organizations can provide food to disaster hit regions and tackle local food security. This unit offers an additional solution of providing clean disease free food in case of a food borne pandemic.

This suggestion is not made with a money making agenda, but rather as a humanitarian innovation. Although it can help iFarm get positive publicity and improve their image as a brand.

Furthermore, as the current situation in the world makes shopping inconvenient or even impossible in many parts of the world. Therefore, the container unit could possibly serve communities in urban areas, providing fresh crops for people who are unable or not willing to do shopping.

6.2.3 Cost structure and pricing

Some of the financial models for iFarm are non profitable for its users and actually cost a lot more than the base value of the harvested crops. However, some of their products enable farming with lower initial investment. An example for this is the rental model for the iFarm cropper, the rental cost per month of the unit is 499 Euros a month for a yield of 4-5 kgs of crops.

In addition to simply lowering the initial cost of the farming units, iFarm could provide wider options for customers purchasing the service. One option could be community owned units which costs can be divided among the neighbourhood.

Considering the pricing, iFarm should map the different options. To elaborate, consumers might find the units still expensive to be purchased at once. Hence, there might be an option of a as a service -pricing, where the software and the unit could be purchased/leased with monthly payment

THANK YOU!

Team 1

Anna - Anniina - Rohan - Tomi - Tuukka

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