International Partnership on Innovation

SAMS - Smart Apiculture Management Services

Deliverable N°2.4

Evaluation of Business Plans

N°2 SAMS User Centered Design Cycles and Business Development

Horizon 2020 (H2020-ICT-39-2017)

Project N°780755

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Author(s)	Dwi Purnomo (UNPAD), Anas Bunyamin (UNPAD), Taufik Ginanjar Danuwidjaja (UNPAD), Nur Al Faizah (UNPAD), Yosef Alemayehu (ICEADDIS), Kibebew Wakjira (HOLETA), Amanda M. Paramita (CVPI), Magdalena Sperl (GIZ)	
Reviewer(s)	Magdalena Sperl (GIZ), Konstanza Jochim (GIZ), Stefanie Schädlich (GIZ)	

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SAMS consortium partners

Logo	Partner name	Short	Country
giz Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH	Deutsche Gesellschaft für internationale Zusammen-arbeit (GIZ) GmbH (Coordinator)	GIZ	Germany
UNIKASSEL VERSITÄT	University of Kassel	UNIKAS	Germany
KARL-FRANZENS-UNIVERSITÄT GRAZ UNIVERSITY OF GRAZ	University of Graz (Institute for Biology)	UNIGRA	Austria
Latvia University of Life Sciences and Technologies	Latvia University of Life Sciences and Technologies	UNILV	Latvia
iceaddis	ICEADDIS – IT-Consultancy PLC	ICEADDIS	Ethiopia
IQQO Oromia Agricultural Research Institute	Oromia Agricultural Research Institute, Holeta Bee Research Center	HOLETA	Ethiopia
Universitas Padjadjaran	Universitas Padjadjaran	UNPAD	Indonesia
PRIMARY TRAINING & CONSULTING	Commanditaire Vennootschap (CV.) Primary Indonesia	CV.PI	Indonesia

List of Abbreviations

BM	Business Model
BMC	Business Model Canvas
ET	Ethiopia
EU	European Union
FGD	Focus Group Discussion
ICT	Information and Communication Technologies
ID	Indonesia
UCD	User Centered Design
DSS	Decision Support System
PCB	Printed Circuit Board

Summary of the project

SAMS is a service offer for beekeepers that allows active monitoring and remote sensing of bee colonies by an appropriate and adapted ICT solution. This system supports the beekeeper in ensuring bee health and bee productivity, since bees play a key role in the preservation of our ecosystem, the global fight against hunger and in ensuring our existence. The high potentials to foster sustainable development in different sectors of the partner regions are they are often used inefficient.

Three continents - three scenarios

(1) In Europe, consumption and trading of honey products are increasing whereas the production is stagnating. Beside honey production, pollination services are less developed. Nevertheless, within the EU 35% of human food consumption depend directly or indirectly on pollination activities.

(2) In Ethiopia, beekeepers have a limited access to modern beehive equipment and bee management systems. Due to these constraints, the apicultural sector is far behind his potential.

(3) The apiculture sector in Indonesia is developing slowly and beekeeping is not a priority in the governmental program. These aspects lead to a low beekeeper rate, a low rate of professional processing of bee products, support and marketing and a lack of professional interconnection with bee products processing companies.

Based on the User Centered Design the core activities of SAMS include the development of marketable SAMS Business Services, the adaption of a hive monitoring system for local needs and usability as well as the adaption of a Decision Support System (DSS) based on an open-source system. As a key factor of success SAMS uses a multi stakeholder approach on an international and national level to foster the involvement and active participation of beekeepers and all relevant stakeholders along the whole value chain of bees.

The aim of SAMS is to:

- enhance international cooperation of ICT and sustainable agriculture between EU and developing countries in pursuit of the EU commitment to the UN Sustainable Development Goal (SDG N°2) “End hunger, achieve food security and improved nutrition and promote sustainable agriculture”
- increases production of bee products
- creates jobs (particularly youths/ women)
- triggers investments and establishes knowledge exchange through networks.

Project objectives

The overall objective of SAMS is to strengthen international cooperation of the EU with developing countries in ICT, concentrating on the field of sustainable agriculture as a vehicle for rural areas. The SAMS Project aims to develop and refine an open-source remote sensing technology and user interaction interface to support small-hold beekeepers in managing and

monitoring the health and productivity in their own bee colonies. Highlighted will be especially the production of bee products and the strengthening of resilience to environmental factors.

- Specific objectives to achieve the aim:
- Addressing requirements of communities and stakeholder
- Adapted monitoring and support technology
- Bee related partnership and cooperation
- International and interregional knowledge and technology transfer
- Training and behavioral response
- Implementation SAMS Business cooperation

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Executive summary

This report provides an overview of the developed 54 SAMS Business Models related to the business development activities including training and education measures like:

- Co-creation workshop in Ethiopia
- Ideathlon workshop in Indonesia
- Web-seminars and business incubation in Indonesia
- Project brainstorming for European Business Models

Out of the 54 SAMS Business Models the eleven most promising ones were identified in a three-step evaluation and rating process:

- Cross-country evaluation and rating
- UCD team discussion
- Expert evaluation and rating

All evaluation and rating comments are included in the report to support and enable the SAMS business start-ups and SMEs to further elaborate their businesses.

Most Important Findings of Market Research

For the SAMS business development the Deliverable D2.3 Results of Market Surveys was considered. The most important results of Ethiopia and Indonesia are summarized in Table 1.

Table 1 Most Important Finding in Ethiopia and Indonesia Market

	Ethiopia	Indonesia
Problems of Domestic Market	• Illegal cross border honey trade • Adulteration of honey bee products • Complaints of consumers about increasing prices of honey products by low quality • Recurrent drought	• Indonesian industry depends on imported raw materials and components • Adulteration of honey • Weather changes due to global climate change
Challenges for beekeepers	• Lack of good beekeeping practice • There is no accredited quality lab for certifying bee products quality for EU market • Lack of proper collection, storage and transportation facilities etc.	• lack of knowledge and materials for successful conduction of beekeeping activities, structural and environmental factors • Lack of good beekeeping practice • Lack of bee colonies (however there is always demand for it when flowering

		season suddenly starts and by new beekeepers) • Lack of proper storage facilities, infrastructure and market facilities • Insufficient quality control
Use of technology	• Beekeepers are interested in digital tools and convinced that technology can improve their daily beekeeping activities and income • Almost no use of digital technology implementation in the apiculture industry in Ethiopia so far • Recently, with the support of the SAMS project, the interest to apply digital solutions on beekeeping activities to improve production and predict harvest raises	• Technology innovation for beekeeping is considered important • Almost no use of digital technology implementation in the apiculture industry • Few start-ups started using monitoring technology for beekeeping (Calakan, inspired by SAMS; KerabaTani, eFishery) • Recently, beekeepers involved in the SAMS project have shown interest in applying digital solutions and receiving the SAMS monitoring technology
Challenges in the use of technology	• There is almost no use of digital technology in the apiculture industry in Ethiopia so far – competitors are only Anabi and Kekros.	• There is almost no use of digital technology in the apiculture sector industry • Young beekeepers have shown to have great knowledge in technology, but most beekeepers are of an older generation have no experience with technology
Potential	• Bee related products are very rare • Products such as beeswax, propolis, pollen, royal jelly and bee venom are among the growing export commodities with good potential • Great potential for expanding businesses of beeswax, packaging material (Glass	• Raw honey and bee-related products are very popular, particularly propolis, royal jelly and bee pollen. Beeswax and venom are bought rarely.

	jar), pollen, migratory beekeeping	

Core and Business Range

The SAMS Business Models range from honey reselling, digital marketplaces, beekeeping supply and logistic, food and beverages (honey derivative products), beekeeping products for health and beauty to tourism, capacity building and professional consultancy, education and technology incl. remote monitoring beehives, decision support system (DSS), printed circuit boards (PCB) and Data Warehouse.

The core and business range in Ethiopia, Indonesia and Europe differs from each other since the apiculture sector of each country is in a different stage. Considering the country needs (see also D2.3 Results of Market Survey) in the business development activities, the Ethiopian, Indonesian and European SAMS Business Models cover the following core and business range:

Table 2 Core and Business Range

Ethiopia	Indonesia	EU
• Capacity building and professional consultancy • Food and beverages • Technology • Smart/modern beehives • Education • Beekeeping supply and logistic • Marketplace platform • Digital platform • Certification agency • Financial agency	• Beauty product • Honey reseller • Tourism • Education • Honey supply • Food and beverages • Health product • Technology	• Logistics/ supply • Software and hardware • Smart Hive/ Hive Monitoring systems • Education

Ethiopia with its great potential in apiculture sector has a wider range of businesses compared to Indonesia, and mainly focuses on beekeeping management. There are only few businesses that offer derivative products, while Indonesia has only few businesses that could improve beekeeping management as well as technology-based business. Most of the Indonesian businesses still focus on bee products or their derivatives, although there are businesses that take up the business domain that supports the improvement of beekeeping management.

The SAMS EU Business Models are strongly supporting modern beekeeping in a holistic way – from education to software, hardware and supporting logistics/ supply such as 3D printed casings (electronics enclosures) for monitoring systems, Data Warehouse, power supply, etc.

Negative Influence on the Process Due to COVID-19

Covid-19 has affected many sectors and aspects globally in positive and negative ways. It had also negative influence on the process of developing the SAMS Business Models. The number of at least 50 (20 per target country Ethiopia and Indonesia, and 10 in the EU) could be fulfilled. However, some SAMS business development activities could not take place and the contact to some business model developers is interrupted with the effect that some business models are still in the ideation status and are not elaborated further by any start-up. Nevertheless, these Business Models are made freely available on the SAMS website and on SAMSwiki and are open for further elaboration by any interested stakeholder.

Ethiopia

Instead of having two co-creation workshops, only one could take place in which ten SAMS Business Models were developed (in January 2020). The second one had to be cancelled due to Covid-19, it was not possible to gather a group of people to organize a physical workshop. As an alternative, ICEADDIS contacted potential start-ups and worked one on one with them to elaborate the last ten SAMS Business Models.

Besides Covid-19, due to temporary political unrest, the internet was cut off by the government for two weeks as a safety measure. Because of this, ICEADDIS was unable to communicate with the business teams, and the communication with the international SAMS project team was frozen for two weeks.

Indonesia

Due to the spread of Covid-19 in Indonesia and some regulations applied to reduce the infected number, such as PSBB (Pembatasan Sosial Berskala Besar, English: Large-Scale Social Restriction), travel restrictions, work and school from home, some business development activities were disturbed. For example, the developers (university students) of the first eight business ideas acquired from Ideathlon could not be reached, and physical co-creation workshops were not possible.

As alternatives, potential stakeholders were searched online via social media and contacted one by one, a web-seminar titled “Maintaining Momentum of Honey Bees Business and Beekeeping Products Post Covid-19 with an Innovative Business Model” in order to reach a wider region and recruit/ get additional businesses was conducted as well as an “Innovative Business Model incubation” with seven web-seminar sessions, three Focus Group Discussions and one inauguration. As a result, 24 SAMS Business Models could be developed for Indonesia. However, a more diverse and holistic business range could not be obtained during the business development activity.

Europe

Due to the Covid-19 outbreak business development training and educations measures could not take place. However, 10 Business Models have been developed by UNILV, UNIKAS and UNIGRA based on the findings of the project and a brainstorming session of all SAMS project partners.

1. Development of SAMS Business Models

This chapter provides information about the templates used for developing the SAMS Business Models as well as the training and education measures.

1.1 Business Model Templates

The Business Model Canvas was used for developing the SAMS Business Models because it is flexible to serve any market and documents the relevant information for commercialization, e.g. key partners, key activities, key resources, value proposition, customer relations, customer segments, channels, cost structure (incl. material costs) and revenue streams. In particular, the reasons are that the Business Model Canvas:

- is well known by the SAMS target group start-ups, SMEs;
- is a practical tool that promotes understanding, discussion, creativity and analysis;
- helps to easily visualize the business idea, and relationships are more visible;
- can be designed individually and updated daily; it makes it easier for entrepreneurs to set up their business of the future since start-ups operate in an environment of uncertainty;
- are evident on the one hand from the type.

Besides the Business Model Canvas, a template with further questions about the business idea and start-up/ SME/ business team (see Annex I) and a self-assessment was set-up (see Annex II).

1.2 Business Development Activities

In order to develop the SAMS Business Models each target country organized several business development activities.

1.2.1. Training and Education Measures

Several business development activities were conducted in Ethiopia, Indonesia and Europe regarding the development of SAMS Businesses. ICEADDIS, UNPAD, UNILV, UNIKAS and UNIGRA were responsible for the process.

Ethiopia

On January 17, 2020 ICEADDIS organized a co-creation workshop for apiculture stakeholders in Ethiopia, it was attended by 14 participants. Main goal of this co-creation workshop was to develop sustainable business ideas/ prototypes, on top of SAMS technology, which is intended for further development by local start-ups and adoption by the apiculture industry. Another aim of this co-creation workshop was to collect feedback from the apiculture stakeholders on how to improve SAMS services for future adaptations for the Ethiopian contexts. As an outcome ten SAMS Business Models were developed and documented in the Business Model Canvas template.

For the next ten SAMS Business Models a second co-creation workshop was planned. Due to Covid-19 it was not possible to gather a group of people and organize a physical workshop. As an alternative, ICEADDIS reached out to businesses that have the potential to integrate SAMS into their services and align with SAMS goals. Thus, ICEADDIS co-develop the next ten SAMS Business Models with ten SME's/ start-ups (22 participants). Some of the business models were selected as most promising SAMS Business Models.

Indonesia

In Indonesia, various activities were carried out to develop the SAMS Business Models from 2018 to 2020. These activities range from Focus Groups Discussions (FGDs), own business development and ideathlon to web-seminars and incubation:

- FGD - Needs Assessment and User Requirement

On March 5-6, 2018 UNPAD conducted a focus group discussion with the title "Needs Assesment and User Requirement". The aim of this FGD was to describe beekeeping conditions and map common beekeeping businesses in Indonesia. 12 beekeeping stakeholders ranging from academics across disciplines, beekeeping researchers, beekeepers, beekeeping activists and government shared their insights and knowledge during this session.

- FGD - Apiculture Industrial Tree Workshop (Pohon Industri Lebah)

On May 23, 2018 an activity that describes the condition of the beekeeping industry tree took place. The beekeeping industry tree is taken from the user experience, especially from bee product consumers who have different backgrounds ranging from academics across disciplines, students and business people. In addition, the point of view of beekeepers and beekeeping activists was added. In this activity 31 participants (beekeeping experts, beekeepers, academics, researchers, students, government and honey businessmen) were involved.

- FGD - Innovative Business Model

On May 30, 2018 the FGD "Innovative Business Model" took place. This activity described the existing business models of beekeeping and current conditions, and provided input and feedback from various stakeholders to beekeepers. The invited beekeepers came from different areas to analyze different conditions, ranging from those around urban areas to remote areas. This event was attended by 18 participants (seven beekeepers were involved).

- Development of Honey Derivative Product Business

In May, 2018 UNPAD developed a honey derivative product business. The development of this business was done by four UNPAD alumni who are interested in product business. The main purpose of this activity was to create a new business which focuses on bee-derivative products especially honey-derivative ones. As a result of this activity, a business which focuses on honey derivative product named Masagi was established (see chapter 2).

- Mini-seminar Bees the Pollinators

On May 27, 2019 a mini seminar on "Bee the Pollinator: Unnoticed Heroes" was held with the aim of disseminating the role of bees in human life. Moreover, the activity aimed to stimulate enthusiasm in developing a bee-based business. Motivated from this activity, one of the participants established a beekeeping business related to selling honey (Madu Baduy). The

activity was attended by 19 participants who came from various backgrounds ranging from beekeepers, government agencies, academics and the general public.

- Ideathlon

On July 7, 2019 UNPAD held an Ideathlon activity involving 59 students as participants. This activity aims to create various concepts of beekeeping business models taken from the students' point of view. Another objective is to introduce and stimulate participants' concerns to be involved in the development of beekeeping in Indonesia. The participants were students from various universities of the city of Bandung. This activity itself was guided by The Local Enablersteam (AB member) as the facilitator of the activity.

- Local IoT system development

In 2019, inspired by the development of the SAMS monitoring system, UNPAD carried out the development of a bee monitoring system that was compiled with local or locally available components. The development of this monitoring system, apart from being one of the business models inspired by the SAMS system, is also expected to be a driving force for the beekeeping IoT system in Indonesia. The development is carried out by involving IoT experts and activists with professional backgrounds as well as academics and also involving beekeepers located in West Java. This local IoT system was developed by a start-up named Calakan (seven people involved).

- Development of Beekeeping Tourism Business – Bandung Bee Sanctuary BBS

Besides the development of a honey-derivative based business, in 2019, UNPAD developed a beekeeping tourism business which was triggered by an unutillized and inactive land owned by UNPAD located in the heart of Bandung city – Dago. This land is considered as a marginal land and was used by the local citizen as garbage dump. UNPAD inisiated to utillize it by converting its usage as a beekeeping site. As a result of this activity, a beekeeping tourism based business named Bandung Bee Sanctuary (BBS) was established and four people are involved as BBS team. The previously developed local IoT system is implemented in BBS. BBS was launched on Januray 10, 2020 and 188 people participated in this event.

- Web-seminar

On June 13, 2020 UNPAD conducted a web-seminar with the theme "Maintaining the Momentum of the Post-COVID-19 for Honeybee Business with an Innovative Business Model". This web-seminar activity was participated by 65 participants from various regions in Indonesia where the participants themselves were not only those who own a business but also those who plan to establish a beekeeping business. The main purpose of this web-seminar was not only to share information and knowledge for future business actors of the beekeeping sector but also to map existing bee businesses. In addition, the aim was to find beekeeping communities who are interested in being engaged in the activity of developing SAMS Business Models to complement the formation of at least 20 SAMS Business Models that are constrained by the COVID-19 pandemic.

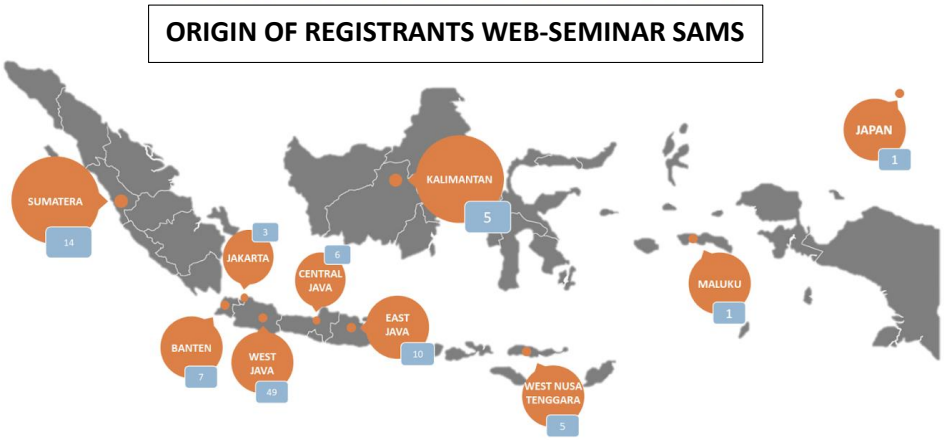

Figure 1 Origin of Registrant Web-seminar SAMS

- Incubation

As following activities of the web-seminar, from July 3 – September 4, 2020, UNPAD conducted an incubation programs titled “Incubation of Innovative Business Model for Beekeeping and Bee Product Businessmen” with seven web-seminars, three FGD and one inauguration (graduation ceremony) which focusing on deep understanding of each BMC blocks. There were 83 participants involved, most of the participants (including 13 SAMS Business Model owners) participated also in the previously conducted web-seminar. The main purpose of this incubation was to support business actors in the beekeeping sector to maintain momentum and scale up their business by understanding business models better. Moreover, it provided a great opportunity to UNPAD to build broader relationships and stay in contact with the SAMS business model creators/ teams. This activity itself was guided by The Local Enablers (AB member) as the facilitator of the activity.

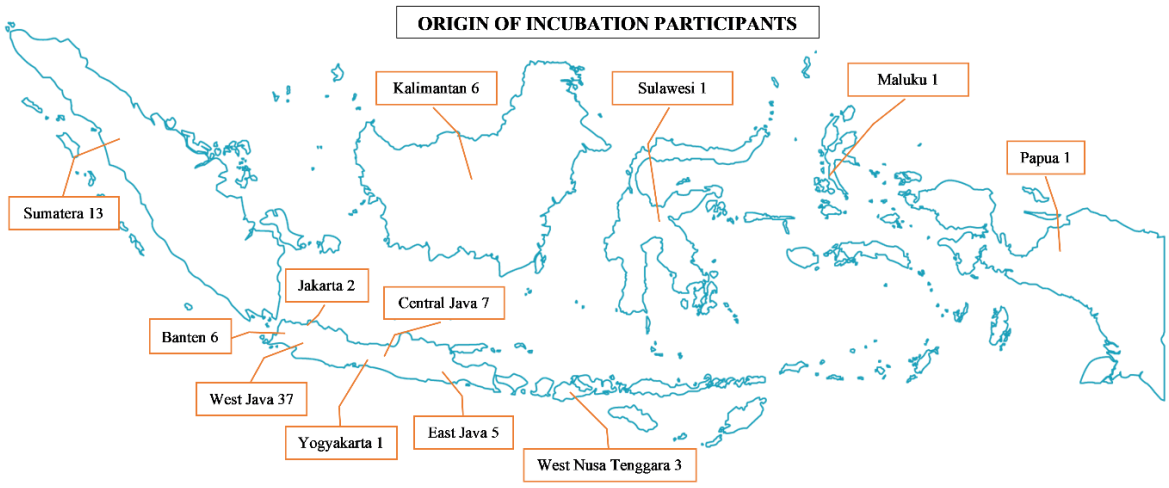

Figure 2 Origin of Incubation Participants

- One-by-one contacting

Due to the outspread of Covid-19, some planned business development activities were canceled. As alternatives, potential stakeholders were searched online via social media, contacted one by one and motivated to join the web-seminar titled “Maintaining Momentum of Honey Bees Business and Beekeeping Products Post Covid-19 with an Innovative Business

Model" and the "Innovative Business Model incubation" with seven web-seminar sessions, three Focus Group Discussions and one inauguration. As a result, 12 SAMS Business Models could be developed for Indonesia.

1.2.2. Involved Target Groups

In total, 547 participants were involved in the SAMS business development in Ethiopia and Indonesia. The involved target groups are listed in the table below.

Table 3 Involved Target Groups

Target Groups	Ethiopia	Indonesia
Participants (total)	36*	511
Beekeepers	7	72
Cooperative	1	297
Input Supplier	11	44
Bee related experts	4	26
Facilitators	4	46
Agripreneur	29	11
SAMS-data beneficiaries	14	79
Female	7	186
Youth	36	151

* some Ethiopian participants are belonging to different target groups; they were counted for more than one target group

2. Range of SAMS Business Models

In order to develop, finalize and evaluate the 54 SAMS Business Models the definition of the SAMS value chain was important. Thus, the SAMS consortium precisely defined the SAMS value chain from the end-user to the market:

"Next to the honey and bee-products, the SAMS value chain includes knowledgeable as well as new beekeepers, beehive designers incl. its supplier (timber, smoker, packaging, veil etc.) and hardware as well as software producers and designers, in particular for the SAMS sensor technology (sensors, technical components, power source etc.) and the software which includes data analysis. Complementary to those stakeholder groups, industrial as well as home-made beekeeping products, consumer demands, the forestry and agriculture industry and local communities and companies, e.g. SMEs, start-ups are considered."

While defining, the consortium saw most potential for developing businesses in beekeeping supply, industrial products, home-made products and sensor technology incl. data analysis.

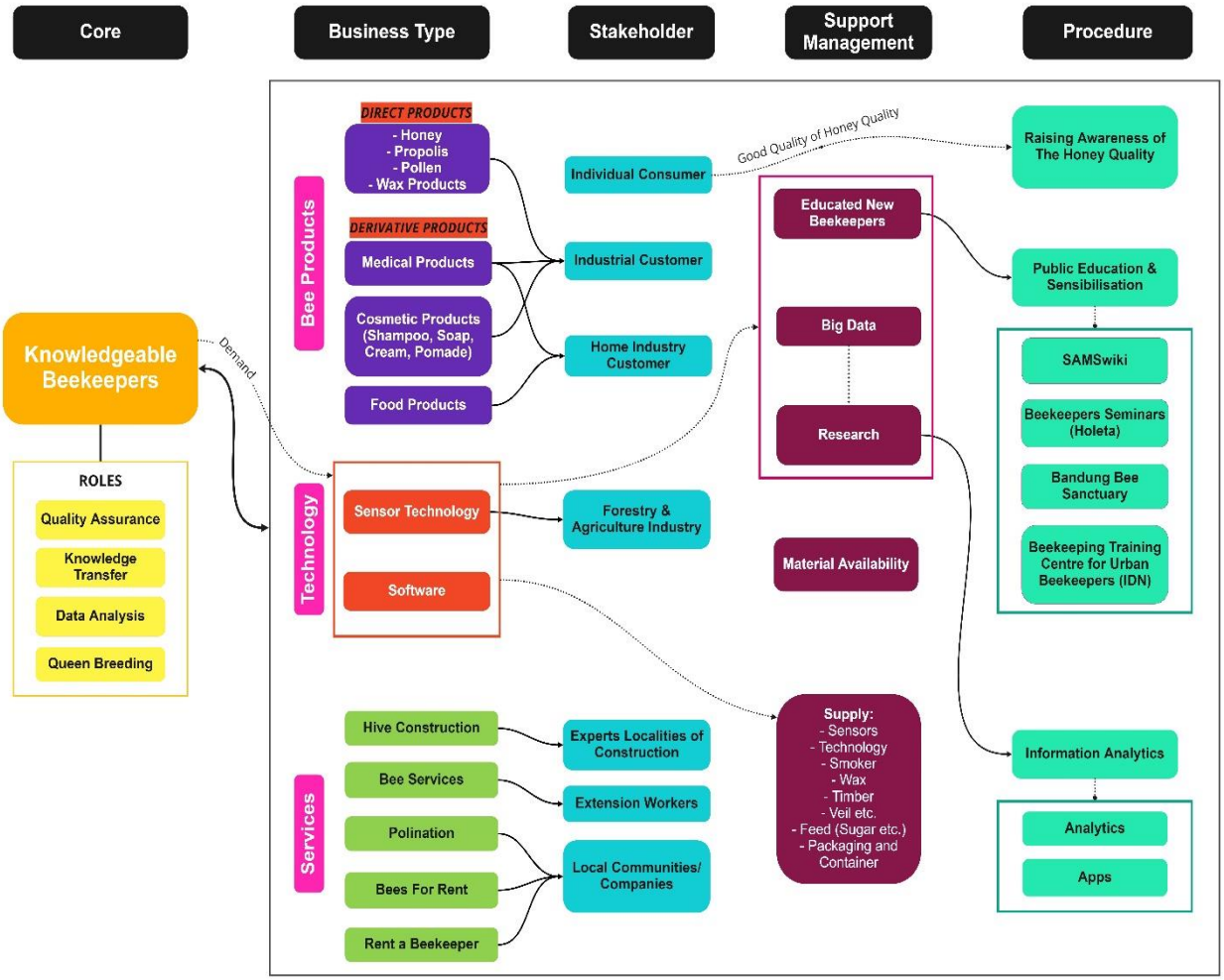

Figure 3 SAMS value chain from the end-user to the market

2.1 Short Business Model descriptions

The following chapter provides detailed information about the 54 developed SAMS business models in Ethiopia, Indonesia and Europe:

- the status of the business models: ideation, first implementation, established business, scale up;
- the developer/ owner as contact persons;
- recommendations and comments which were provided in the three-step rating process.

The compiled information serves as entry point for interested individuals and for future adaptions, especially for those business models which could not be finally developed by the initial teams. For each Business Model there is a Business Model Canvas available in the Annex (for Ethiopia see Annex III, for Indonesia see Annex IV, for EU see Annex V). All business models are also available open source on the SAMS website and on SAMSwiki for further elaboration.

2.1.1. Ethiopia

The 20 Ethiopian SAMS Business Models are:

2.1.1.1. Anabi

Anabi directly sells smart beehives at lower prices for partner beekeepers, and smart beehives (beehives with monitoring and decision support systems) will be rented to crop growers. The leasing will take place during the flowering period. Anabi provides its system for partner beekeepers throughout the year. Anabi also sells bee products, particularly mono-floral honey for the global market with negotiation to its partner beekeepers.

- Status of the Business Model: established; contact person: Abiye Tadeos
- Recommendations (according to evaluation and rating):

This startup is well suited to follow up on SAMS implementation. the team is composed of skilled professionals to succeed the implementation and decimation of SAMS system and continues improvement.

The business idea is good developed, first implementations have taken place. The business model is about developing and selling beehives (beehives with monitoring and decision support systems) to partner beekeepers, in the following crop growers can rent them; and selling it to other beekeepers. Identified problems: 1. Poor beehive management that is causing poor bee colony strength and lack of constant production and/or supply in bee products; 2. Poor quality and small crop yield due to lack of pollination. The business models is based on the SAMS project and the SAMS monitoring system and thus have a high SAMS relevance. The business model seems financially feasible, the team seems motivated (took part in competitions, established business in 2019 and fully registered it in May 2020).

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High relevance for SAMS, the team seems to be very determined to start their business which is based on sales of smart beehives, commission from pollination fees, sale of honey, subscription from decision support advisory. Moreover, they have a good description of the user and user problem and seem to have conducted good research.

They are in close contact with the SAMS project partner UNILV and they have managed to send data into the SAMS Data Warehouse (but only a single data point). About the monitoring systems they use, they are experimenting with their own system (it is possible, that they use also some parts from SAMS HIVE). They also show interest about the whole DW infrastructure (how to set it up, how the DSS is implemented etc.).

High relevance for SAMS Project and potential successor of SAMS Project.

I am not sure if there is a market for this at the moment.

Taking on the SAMS idea including app/recommendation development. Nevertheless, I see no information on interviews/ surveys if beekeepers would be willing to pay for such system even if it is less expensive - but then also the quality aspect of such systems comes along – and the question of the lifetime of components? For leasing such system I do miss the benefit factor here for the beekeepers as they are not aware yet on such benefits and why they shall use such system - but in case the renting works it would enable ANABi also to provide/ sell dataset to other companies/ research institutes etc. to gain additional income which could be shared with the beekeeper - specific ratio)

Anabi is interesting, the business is running (plus point), feasible and concrete, the business concept is clear.

The business model is well prepared. Its status already established and registered. The business idea flow indicates that there are well experienced professionals in the business. The business is highly relevant with SAMS intervention. The business idea show how beekeeping can be integrated with other agricultural production such as crop, fruit and environment. The business idea has identified major the challenges of low production/productivity of the bee products. In addition, the technology innovation (smart beehives) could augment bee products and improves the management aspects. The type of engagement is like introducing migratory beekeeping practice following the flowering season and geography. In a nutshell, I found the idea is very interesting and novel. As limitation, the business idea does not show how to introduce the new practice by convincing farmers that bee could improve crop productivity by the bees as pollination agent. And the price for the pollination service is a bit expensive. In addition, in the business model it is not describes how to convince farmers that pollination by bees could improve productivity. Farmers need practical trail and demonstration using controlled and opened variables. As a result, the introduction and dissemination process take some more time to sell the technology and the service.

Business Model with renting option for beehives are a great opportunity. The revenue model should include promising/measuring benefits from improved pollination rates.

2.1.1.2. Awesome Africa

Awesome Africa helps local apiculture enterprises or individual producers to prosper themselves by giving them easy access to highly established disciplines and techniques of organic and high yield honey production. Furthermore, it helps apiculture enterprises or individual producers to take the best advantage of those skills and increase the quality as well as quantity of their production. It also provides supply chain facilitation services for beekeepers.

- Status of the Business Model: not established; contact person: Meraf Theodros
- Recommendations (according to evaluation and rating):

This is a suitable start-up to integrate SAMS's DSS system to the business idea but currently, the business is at early stage to implement SAMS to their concept.

According to the score the business model is good developed. However, the status of the business model is not clear (idea or established). The business is about an educational platform where any interested groups or individuals get the skills and knowledge in the industry (from small scale to large scale), which will be provided in a wide variety of languages and for different climates in order to scale-up. The business also focuses on organic production and exporting honey (=market research result, D2.3) by offering supply chain services, too. The SAMS relevance is given in terms of supporting the apiculture sector in ET, in terms of knowledge transfer, empowering women/ your, create jobs. The start-up is supported by Green Innovation AgriTech Slam 2019 (seed fund) and was established in June 2019.

Relevance for SAMS - the start-up is highly motivated but lacks business related skills, the idea is based on providing access to technical solutions for more effective beekeeping. Nevertheless, it lacks description of the technologies on which the idea is based.

Name could be a bit more explanatory.

If this idea totally focuses on organic aspect/ seeds/ producing components/ disciplines etc., then it could survive but I miss the real concept of the business - if such concepts gets developed more in detail and considers external factors and future development of organic products and possibilities it could be of great success.

2.1.1.3. Bee Colony Transportation Tool

The bee colony transportation tool is an affordable and efficient equipment for transporting a small number of bee colonies from apiaries to other apiaries and to the bee colony market.

- Status of the Business Model: established; contact person: Teshome Erge
- Recommendations (according to evaluation and rating):

The technology description is not clearly described so it is difficult to relate it to "the identified problem your business idea tackles"", also it's hard to understand the product just by reading the description. Without the BMC we couldn't analyses further, such as the channel they use, is it available through mobile apps, how they promote it, etc. It is difficult to get information online.

The business status is a bit confusing between first implementation and established business as they chose them both.

More information can be found at (see the third team in the video) https://youtu.be/aTFh5YVcRqQ

I believe this startup identifies a notable challenge and developed a solution that fits in the country context. and this solution has a market tested product with encouraging feedback from the industry.

2.1.1.4. Daemat

Farmers do not have a convenient way of selling their products to consumers; instead, they deliver them to middlemen brokers and wholesalers who sell the agricultural products at exploitative prices (between 100-150%). As a result, farmers do not get the income they should and could get out of their products. A price volatility due to seasonality supply, a lack of market information and the loss of product quality during inconvenient transportation of

the products is the main issue in the food value chain. Daemat is a digital market platform that allows agricultural product producers to directly sell their products to consumers and gain better financial benefits.

- Status of the Business Model: established; contact person: Kisanet Haile Molla
- Recommendations (according to evaluation and rating):

The Business Model is good developed; it is established. Its relevance to the apiculture sector in Ethiopia is given - it supports beekeepers to sell their products directly to consumers via an online platform/ ecommerce and thus to increase their income (when delivering to middlemen brokers and wholesalers, they get low prices). There are some competitors, but UVP of the business are: The business provides a transparent and efficient value chain, products directly from beekeepers. The team seems to be very motivated (took part in several business competitions), the start-up exists since 04/2018. The SAMS relevance is given (poor) it helps to increase beekeepers' income and supports the demand for more transparency (=market research result).

This starts up will address the market availability of small holder beekeepers to the mainstream market and increase the financial benefit for the beekeepers. on the other hand, it may not directly implement SAMS services to the Apiculture industry.

Direct marketing is always desired. I wonder why this start-up is needed to achieve this? Will cut the income of middleman and their families!

It is a great idea to empower beekeepers and women along the value chain by selling their products combined with QR code for following the value chain it might have potential to be successful. Nevertheless, also here other ideas/ business is on the market with such concept - unique selling point to compete is missing

https://www.nachhaltige-agrarlieferketten.org/en/

Daemat serves an interesting idea, marketplace is always relevant, the relevance to complement the honey value chain is very suitable.

The business idea is good. It describes how the linkage accrues market players improves their effectiveness and efficiency and backward and forward linkage. However, the business/ digital marketing platform/ didn't explain how to solve the systemic problem of agricultural marketing. product seasonality and price volatility could not be solved by establishing digital market platform alone unless holistic approach is in place from production to end market. The digital marketing platform helps little those farmers that supply poor quality and/ or low marketable volume. The business model didn't explain as to how smallholder producers living far in the deep rural benefits from this service. Even with the existing of digital platform, the services of middlemen are still required to bring fragmented produce by aggregating them to the marketing platform. So, the platform will be effective only if the negotiation relation between producers, other market players act in coordination and collaborated approach rather than giving names to each other. The business plan needs to show, in addition, how product nasality/ supply inconsistency of, and price fluctuation occur.

High relevance of BM in order to improve the living conditions of farmers in general. BM needs to link directly to bee products and improves the market conditions.

2.1.1.5. Ethiopian Honey and Beeswax Producers Exporters Association

The *Ethiopian Honey and Beeswax Producers Exporters Association* is an institution that helps local honey producers and processors to reach a greater product stage and export to the global market. Besides that, it provides professional consultancy and capacity building activities for beekeepers and honey processors.

- Status of the Business Model: established; contact person: Alemseged Gebrekidan
- BMC of this SME is not available
- Recommendations (according to evaluation and rating):

This is the association of honey exporters but established for-profit making. This business might also/ better fit as SAMS Partnership network member/ partner

This Association has a track record on the apiculture business and composed of experienced peoples in the industry. It can be a good communication platform between Ethiopian bee products and international by-product market.

This is a running business, established business. I think this one doesn't have that much relevancies with the SAMS product but very much relevancies with the honey selling value chain.

This is a running business, established business. I think this one doesn't have that much relevancies with the SAMS product but very much relevancies with the honey selling value chain.

This is what beekeeping is about!

Can't see huge success of the idea especially since there is no business plan behind which brings up the point that this has not been thought through yet - nevertheless first station as I see would be the inclusion and awareness among beekeepers for wax as they have not much knowledge about the potential of it/ income aspect/ etc. - this would also enable the switch from traditional/transitional to modern beekeeping as modern beekeeping has the most outcome of beeswax related to the others.

This BM helps the problem of honey export needs in Ethiopia.

This association has good track records in connecting beekeeper producers to the international buyers. The association has stimulated Ethiopian beekeeping sectors since its establishment and strengthen the linkage and introduced Ethiopian honey to the international consumer. In this regard, the role of the association has made paramount contribution and expected to do more. The capacity of producers and exporters still need to be strengthened so that quality bee products (honey and bees wax) will be supplied to the national and international market. The association is well established and has full technical and professional staffs that could run the business. The relevance to SAMS intervention is minimum. The business model has not properly articulated in its future intervention other than business as usual.

2.1.1.6. Kekros Ethiopia

Kekros Ethiopia expects to engage in multiple apiculture business sectors in Ethiopia – developing a website to give (1) online beekeeping training for agricultural professionals and beekeepers to improve their production quality and quantity, (2) manufacturing

beekeeping supply like a quality beehive for beekeepers, (3) designing and developing a beehive monitoring system for beekeepers and researchers, (4) producing quality honey and beeswax for local and export markets using its own products and services lines.

- Status of the Business Model: established; contact person: Negasa Berhanu
- Recommendations (according to evaluation and rating):

This SME is very relevant for SAMS and capable of implementing their solutions into the apiculture industry.

The business model is good developed, first implementations have taken place. However, at the first moment it become not totally clear what the business idea is exactly about - it focuses on monitoring systems (design, develop, collect data) that should be sold to beekeepers and researchers. In addition, they mention the development of beehives, production of good quality honey and beeswax and the development of a beekeeping training website. When considering their aim to play a key role in apiculture industry nationally and internationally in about 5 years, the provision of different solutions facing several apiculture aspects is worth. The SAMS relevance is high in terms of jobs, women/ youth, modern beehives, productivity, data transferability, knowledge transfer, investments and reduction of api management efforts. In general, the business might have a high relevance for the apiculture sector in ET scalable through open source technology.

Re-inventing the wheel or probably the most underrated business plan for Ethiopia. I did not completely get it. Maybe some more focus on proving teaching materials and education should be made!

In line with the SAMS idea - but no business model available, could have potential but complete idea, revenue etc. becomes not clear also the process on how they want to bring their ideas on the ground, to the beekeeper and scientists is missing - poorly developed.

Kekros is interesting because it provides online beekeeping training, it will help the process of transfer knowledge, especially during a pandemic like this. The business model based on rating tables is good developed (stronger in knowledge and data transfer), for implementation it is felt that it can run soon (more realistic).

The business model is directly relevant with SAMS approach and the intervention is multidimension from providing online training service, supplying beekeeping equipment's and plan to engage in bee products (honey and beeswax) marketing. This business will enhance the capacity of beekeepers to practice modern beekeeping management by using quality technology. However, as the training is offered online, the business model doesn't show how it reaches more than 90% of smallholder beekeepers living in the deep rural areas, who have no access to internet services? In addition, the affordability of the beekeeping equipment's that will be supplied by this business is not known/estimated. In addition, the distribution mechanism/approach of the technologies is not stated. What makes special to those technologies supplied from the rest of other suppliers in terms of quality, productivity, easiness to management, price affordability to the majority of small beekeepers' cost? Supply alone does not prove accessing.

BM basically continuation of the SAMS project. Networking is relevant, while the revenue stream needs further improvement.

2.1.1.7. Birzz by Yiblu

Birzz is an alternative healthy energy drink. Birzz will be bought and used by any one at any young age to adult (> 10 years old) at retail outlets or directly from the Birzz online store in order to boost daily energy with a healthy drink.

- Status of the Business Model: established; contact person: Azeb Assefa
- Recommendations (according to evaluation and rating):

This SME has a good product that can sell in the urban market with competitive price as a premium product for health-conscious customers. and receive a positive feedback from small scale user test.

In my opinion this business model is the most comprehensive Business plan among other plans I rated. The way they fill in the form shows how much they understand their products and to me it shows the effort they put into this business. In relevance to SAMS Product, I would say it has a little contribution to the monitoring system, but since they need consistent source of honey and they are planning to build long and deep relationship with beekeepers (which they encourage to have high productivity to meet their demands), I would say they can be SAMS monitoring system's customer.

This can work! I am much looking forward to it!

Great idea in contrast to tej and religious aspects but only the honey drink as product will not be a success and the business will probably go down quickly; so extendable - there are way more options to create that business under health aspects! - big potential with more work and market research - if quality is good potential for export of such products could be possible.

Birzz by Yiblu is attractive and relevant because it is the only BM/SME that offers/develops honey derivative products and has a clearer target market (general public, the urban community), very feasible to run.

The business owner identified products – Birzz - that is being produced and consumed as traditional drink. The business model is explained well in terms of how it expands in the future though non bee products like spice, food bleeding is mixed with bee product – Birzz, which is the point centre of the business competition call. The status of the SME is not clear. It is selected both ideation and business implementation. Birzz can be made anywhere so long as there is water and honey. I could not read any unique selling point that makes this product is preferred. How is the brewing process takes place? Does the business use modern technologies, is there any quality standards that help the business to promote its product as unique? Is it bottled and packed or not? The target customers are not well defined-it is described in generic terms. The marketing channel/relationship/ with producers is no clear. where does SME collect quality honey?

BM attacks the market from a different angle: by developing consumer markets of honey products. The channels and customer segment need to be broadened: why not integrate gyms as spaces of middle-class people, health-conscious and "hipp"? This could be the next organic energy drink "flying bee"/"yellow bee" (instead of red bull).

2.1.1.8. MBeeHive

MBeeHive is a low-cost new kind of modern hive, that enable the user to extract/harvest the honey directly from the beehive. It will be bought by beekeepers for 2,500 Birr at the

MBeeHive shop in order to increase honey productivity almost averagely by 3.5 times and get high-quality nectar honey with much less time and cost.

- Status of the Business Model: not established; contact person: Andualem Lemecha
- Recommendations (according to evaluation and rating):

This start-up is at a very early stage and didn't prototype their concept. This business is planning to design a brand-new beehive construction but currently it is only a 3D model and not tested on a real case scenario.

The business model is good developed - the start-up puts lots of efforts to develop it very thoughtful (concrete problem definition and user needs etc.). The status is: ideation. The business is about beehive construction and selling - MBeeHive will be bought by beekeepers in order to increase honey productivity almost averagely by 3.5X and get high quality nectar honey with much less time and cost. Impact of business idea: a) Boost honey productivity, b) Beekeeping technology transfer, c) New honey extraction technology. It has a high relevance for the apiculture sector in Ethiopia and supports the government aim to increase the productivity rate. Moreover, the SAMS relevance is high, especially in terms of increasing the productivity rate and quality of honey (= results of market research D2.3).

The idea is relevant for SAMS, have a clear description of the problem the tackle and their solution to it. Financial model was not yet through. Idea based on boosting honey productivity, technology transfer and new honey extraction technology.

I consider it as good one, though the proof of concept (prototype) is missing.

However, precisely because of the simplicity of the procedure, there is a risk that the true focus of beekeeping could be lost. It is not beekeeping or the knowledge of beekeepers that is improved, but rather the process of as bees in Ethiopia are more aggressive, I see a benefit. Nevertheless, such systems are not in line with protection and conservation of bees and the way of beekeeping. No bee friendly beekeeping is practiced. There is no consideration of leaving the bees food as well for times were not much nectar is available in the area. Depending on where such system is installed - temperature may hinder flow of nectar and in addition even uncovered/ open combs will be "pressed out" so honey quality will decrease! No organically aspects behind this idea/ no potential for export of honey. Effect on bee's health is not clear – what about the ethical aspects? From my point of view this is only for lazy beekeepers who would quickly like to harvest to sell the honey to tej breweries.

The business is 'immature', the concept of business is still unclear, not concrete. Anabi is more concrete, it still looks like an idea, development is still at the early stage, it is very far from reaching the ready stage for implementation

The business idea is good and target to boost the production volume of beekeepers. Even the idea of extracting directly from the hives without disturbing and killing the bees makes the technology preferable. Its impact improves the marketable volume and its quality so that Ethiopia could compete in the international honey market. The business status is on idea phase. The business is relevant with SAMS impact. The project, however, should indicate how it could construct low cost beehives. What technology is in place to make efficient and low in price. In addition, the time this product becomes saleable was mentioned between 0-4 months. As it is a new technology it needs a bit longer period to promote and convince buyers. The human resource they propose are only two. Otherwise, this would an original breakthrough in the beekeeping technology particularly extracting directly from the hives.

Clear BM with mayor clients in focus.

2.1.1.9. Samuel Livestock production

Samuel Livestock production is a start-up producing honey mix with fruit marmalade, distributing the product with competitive price.

- Status of the Business Model: established; contact person: Samuel Taye
- BMC of this SME is not available
- Recommendations (according to evaluation and rating):

Assessment is done by combining template data with information from video (https://youtu.be/aTFh5YVcRqQ), see the second team in this video.

Difficult to do an assessment because many points are not appropriate or not filled.

The concept they brought by adding value to honey products and their aim to export the product are great.

Team members are unclear, regarding their numbers and expertise.

This SME is a good potential for value-adding products on honey. But the quality of the product is poor and wouldn't fit the target market described by the business.

2.1.1.10. Meareg and Fanta

Mareg and Fanta is a honey sourcing and packaging company. This SME serves several types of honey from local regions and sells the honey in the urban market.

- Status of the Business Model: established; contact person: Mareg Fanta
- BMC of this SME is not available
- Recommendations (according to evaluation and rating):

This SME is ok on the existing establishment parameter at this time but very unclear about the business concept and follow traditional business operations, this may be a bottleneck as integrating SAMS technology in the business.

The business is good developed, it is established and ready for scale-up. The business is about reselling honey (red, white and yellow honey) to different customers (supermarkets, hotels, medicine, exporters, communities). The SAMS relevance is good in terms of jobs and empowering women/ youths. Regarding the market research results, the business supports the high potential for exporting honey and the increasing demand for honey.

However, the relationship (fair prices, fair working conditions etc.) between the start-up and the beekeepers is not clear.

The word Fanta in business name sounds not good in relation to honey!

If glass is considered as packaging material it might have great potential - based on that it is hardly to tell as no business model is available and the feedback of the ideation giver is not readable for me.

This business is interesting (regarding packaging), because indeed the conditions in Ethiopia for honey packaging need to be packaged better, but the business concept is still unclear, BMC is not available.

Engaging as SME in the beekeeping market helps to link producers and buyers. This business is planning to scale up the different types of honey for the urban consumers. The business also creates jobs for youth and women. However, the business model is not clear in terms of how it markets the honey differently from the conventions trading.

BM remains unclear, empowerment of society is good, yet the revenue model is not clear.

Bee Colony transportation facilitation tool

The technology description is not clearly described so it is difficult to relate it to "the identified problem your business idea tackles".

The business status is a bit confusing between first implementation and established business as they chose them both. More information can be found at (see the third team in the video) https://youtu.be/aTFh5YVcRqQ

This start-up identifies a notable challenge and developed a solution that fits in the country context. and this solution has a market tested product with encouraging feedback from the industry.

This sounds very promising, but a prototype or explanation is missing!!

It does not have a business model yet; how does the customer structure look like - how many people really need such service?

The Business Model is less associated with SAMS but can complement the logistics of beekeeping in Ethiopia.

The business idea is good and necessary to promote and makes the apiculture subsector become attractive for existing and potential beekeepers. One of the major challenges to the apiculture sector is drastic decline of bee colony due to social and natural factors. Therefore, unlike the past, beekeeping Ethiopia are forced to buy bee colonies in a market that are supplied by colony multiplication centre/ individuals. This situation calls for a new technology that support for smooth transportation and transfer of bee colony. Thus, this business model has proposed an appropriate technology. However, it is not well articulated with regard existing and potential demand and the 'how parts. The business seems more of ideal since the actual product is not in the market to test the demand in practice. Of course, there are situations where "supply creates its own demand. In addition, the business status is not clear whether it is in ideation or other stage. The other area that the business model minimizes role and give little attention about competitors. In a business there always exists competitors be it existing or new entrants following the new technology invention. Imitators, with no doubt, will come sooner or later, after the technology is in the market.

Relevance of the tool offered remains vague, very little innovation. The BM and efficiency of the transportation box might be increased if cooling is introduced or automated smoke injection is integrated etc.

2.1.1.11. SmartHive

SmartHive is a business manufacturing an all in one smart hives (ready sensors installed hives) and distribute smart hives as a business.

- Status of the Business Model: ideation; freely available for further elaboration; developed by UNILV; contact person: no team (contact ICEADDIS team)
- Recommendations (according to evaluation and rating):

Rating based on BMC, idea based on manufacture of beehives, therefore valuable for SAMS.

2.1.1.12. Mar-Tera

Mar-Tera is a physical and digital beekeeping market place to bring and connect all stakeholders of the beekeeping sector including beekeeping equipment (hives, frames, suits, honey extractor, tools etc.), bee products (nectar, beeswax, pollen, bee bread propolis, royal jelly etc.) and apiculture service providers.

- Status of the Business Model: ideation; freely available for further elaboration; developed by UNILV; contact person: no team (contact ICEADDIS team)
- Recommendations (according to evaluation and rating):

Here is probably a need within beekeepers for the product comprising a platform for beekeeping. Therefore, the relevance for SAMS is high. However, the revenue model is debatable.

Very good concept but no one to follow up

2.1.1.13. NibFinance

NibFinance raises funds and invest in entrepreneurs and start-ups who are working in the apiculture industry.

- Status of the Business Model: ideation; freely available for further elaboration; developed by UNILV; contact person: no team (contact ICEADDIS team)
- Recommendations (according to evaluation and rating):

Rating based on BMC. Idea is not properly described in the canvas, therefore not possible to identify value for SAMS: poor value.

Very good concept but no technical breakdown of the implementation.

2.1.1.14. EneMar

EneMar is a bee education framework which is a holistic system to promote the culture of beekeeping by setting up beekeeping modules in schools and beekeeping clubs, trainings

and certifying beekeepers. EneMar also provides a mapped value chain of beekeeping and stakeholders for better market value of bee products.

- Status of the Business Model: ideation; freely available for further elaboration; developed by UNILV; contact person: no team (contact ICEADDIS team)
- Recommendations (according to evaluation and rating):

Quite nice idea, but there's no real team behind it. Nevertheless, this idea has high relevancies with SAMS project.

Very good concept but it is at very at early stage. However, it is very relevant for Ethiopia. Thus, it should be developed further by any start-up.

I can see here synergies with business models in the EU and elsewhere.

Great idea - potential to be elaborated further/ provided to an existing business, questionable is if this may has the potential to be boosted to governmental structure for support as the agriculture sector has great importance and the apiculture sector a huge unused potential - so economical aspects for the country/ specific regions could be enormous - could also boost the African (& worldwide) position of ET in the apiculture sector.

Enemar is not promising to be an established business, it is difficult because there is no team behind, and for the concept if in Indonesia it is similar to extracurricular activities, there must be cooperation with schools / universities so that their activities can be embedded (integrated) with school programs. As a business can be quite difficult to be an independent business.

This is a good business concept. Education and training are very essential to change the image of the majority of Ethiopian that beekeeping is one of the best livelihoods and maintain the balance of environmental conservation and agriculture. This business model plans to give awareness, education and skill trainings at different level including in the school as extra-curricular. However, the how part is not well described, and its effectiveness is not promising.

EneMar is not clear despite great relevance.

2.1.1.15. BeeQ

BeeQ is a business to set up and certifying bee product quality standards. This will help fitting honey adulteration and improves consumer trust on bee products.

- Status of the Business Model: ideation; freely available for further elaboration; developed by UNILV; contact person: no team (contact ICEADDIS team)
- Recommendations (according to evaluation and rating):

What kind of certification? because the customer segment is quite broad in the field of beekeeping.

Is it a certification agency or consulting services?

Team member? youth? women?

Ideation? Established? (missing template and self-assessment documents/no information)

Very good concept but not well formulated how it is going to establish on the current system.

2.1.1.16. NibFM

NibFM is a radio show for beekeepers and all stakeholders of the beekeeping sector. The station will provide industrial information for beekeepers and stakeholders on topics like best practices, weather forecast, pollination time and market prices.

- Status of the Business Model: ideation; freely available for further elaboration; developed by UNILV; contact person: no team (contact ICEADDIS team)
- Recommendations (according to evaluation and rating):

No information available about the skills and knowledge of the start-up team. The business idea has the potential to scale the impact of the SAMS project locally.

Very good concept but not tested in real scenarios and have no feedback from the market to evaluate the effectiveness of the idea.

2.1.1.17. Ai1H

Ai1H is a concept beehive that allows the beekeeper to harvest bee products as finished material from the hive.

- Status of the Business Model: ideation; freely available for further elaboration; developed by UNILV; contact person: no team (contact ICEADDIS team)
- Recommendations (according to evaluation and rating):

It is not clear if there is a need in the market for high-tech beehives in ET. The market-volume might be low. Could be analyzed by researching if the business idea is existing and running in ET or somewhere else. Still, the product idea is supporting the impact of the SAMS project.

This idea is at brainstorming stage and the technical requirement for constructing the targeted hives are not researched.

2.1.1.18. BeeGarden

BeeGarden is a holistic approach to specialty bee products production by setting up beehives around specialized gardens to guarantee the production of premium bee products.

- Status of the Business Model: ideation; freely available for further elaboration; developed by UNILV; contact person: no team (contact ICEADDIS team)
- Recommendations (according to evaluation and rating):

Idea relevant for Honey business but not directly for SAMS (=smart honey business) as the use of modern beehives is not mentioned. They want to sell specialized honey produced in specialized gardens but no mention of using a monitoring system. Poor relevance for SAMS.

Good concept but very little impact compared to the management cost.

2.1.1.19. BeeBlock

BeeBlock is a digital platform to build on top of a block chain that guarantee bee product quality.

- Status of the Business Model: ideation; freely available for further elaboration; developed by UNILV; contact person: no team (contact ICEADDIS team)
- Recommendations (according to evaluation and rating):

It is not clear if the product solves a existing problem efficiently.

Good concept but not tested in real scenarios and have no feedback from the market to evaluate the effectiveness of the idea.

2.1.1.20. BeeBuzz

BeeBuzz is a technology that enables communication with bees using special radio signals communicating flower and garden location to optimize the production rate.

- Status of the Business Model: ideation; freely available for further elaboration; developed by UNILV; contact person: no team (contact ICEADDIS team)
- Recommendations (according to evaluation and rating):

Rating based on BMC. The idea is based on an invention that does not exist yet, (communication with bees through special signals). Therefore no relevance for SAMS

The coolest business idea but has not validated with felled research.

2.1.2. Indonesia

The 24 Indonesian SAMS Business Models are:

2.1.2.1. Bee Quest

Bee Quest is a digital platform for beekeepers integrated throughout the world. Bee Quest application provides various information and all information related to beekeeping so that farmers can develop their business. The impact which shall be created by this application is to connect local beekeepers with other beekeepers from abroad so that they can exchange information and expand the honey sales market. This application can facilitate communication between beekeepers directly with consumers so consumers can get guarantees of pure honey. In addition, this platform aims to make it easier for customers who are interested in beekeeping to find beekeepers who are scattered throughout the world. So that customers have no trouble finding the nearest producer or beekeeper that can be visited. It also provides a discussion forum between beekeepers, government, academics, business, community and media to share knowledge or information related to beekeeping.

- Status of the Business Model: ideation; freely available for further elaboration; developed by Ideathlon participants; contact person: no team (contact UNPAD team).

- Recommendations (according to evaluation and rating):

The Business Model is poor developed; there is no team/ start-up/ SME working on it right now anymore. Moreover, there have not been done lots of market research (if the business is really needed or if there are maybe already other similar platforms available). The SAMS relevance is also poor; the Business Model's SAMS relevance is also poor when considering the results of the market analysis (D2.3) - a digital platform for beekeepers and consumers have not been identified as important. However, it tackled the ID problem of impure honey - via the platform consumer and beekeeper can communicate directly and the consumer can therefore get guarantees of pure honey.

There is no team yet, so the assessment is based on/in the form of current conditions and their potential.

Good idea but to be applied worldwide is less realistic, it is better from a small area first, then expansion.

2.1.2.2. App Beekeeper

The Beekeeper App is an educational application for new beekeepers which compiles information about beekeeping by using an interactive and easy understandable approach. Beside developing the online application, App Beekeepers focuses on carrying out social activities such as creating social community movements through educational workshops and seminars. This application aims to assist beekeepers, especially new beekeepers in starting their beekeeping activities. Not only bee farmers will get benefits but also people who have interest in learning about beekeeping.

- Status of the Business Model: ideation; freely available for further elaboration; developed by Ideathlon participants; contact person: no team (contact UNPAD team).
- Recommendations (according to evaluation and rating):

There is a demand for the product in the market. However, the revenue stream might be low. SAMS relevance is high.

Still an idea without a team. There is no similar idea in Indonesian, but there will be quite a lot of challenges in working with offline activities.

The idea of social movement is still not specific in what field.

2.1.2.3. HOI Jelly Skincare

Develop herbal skincare products (skincare) is very promising as royal jelly moisturizes skin and prevent aging through its contains vitamins and essential fatty acids. The purpose of this business is to help improve the welfare of honey beekeepers in the Bandung area. Also, this product is expected to be a safe cosmetic choice for the skin.

- Status of the Business Model: ideation; freely available for further elaboration; developed by Ideathlon participants; contact person: no team (contact UNPAD team).
- Recommendations (according to evaluation and rating):

Still an idea without a team. The involvement with the apiculture sector is still in the form of beekeeping products supply needs.

There is no explanation regarding empowerment and other benefits that the beekeepers will get.

only BMC available, no team; business for sales of herbal cosmetics / skincare products. Poor SAMS relevance, does not explicitly mention any of the SAMS impact points. Could function to spread the idea of SAMS but this ist not part of the business model.

2.1.2.4. Bee a Flower Apps

Bee a Flower is a flower calendar for beekeepers in order to be able to plant the main source of bee food in a sustainable manner according to the time of flowering/blooming to prevent food shortages during the dry season, asthe availability of pollen and nectar from flowers is very important for bee colonies and the beekeepers to gain income(pollen is a source of protein, while nectar is a source of energy for bee colonies). Based on this, the Bee a Flower application was developed. The purpose of the application is to help beekeepers to plant bee forage according to the time of flowering so bee feed remains available throughout the year. The source of the spring calendar data is obtained from scientific journals and information from experts.

- Status of the Business Model: ideation; freely available for further elaboration; developed by Ideathlon participants; contact person: no team (contact UNPAD team).
- Recommendations (according to evaluation and rating):

This rating had done based on BMC only (in the form of ideas and no team). This business idea won our ideathlon (co-creation) because they had the most outstanding idea about having an automatic watering flowers with a scheduled time and having flower calendar as it's needed by farmers to increase productivity. More specific revenue stream is needed.

This business model has no team behind, and poorly developed. The market segment and the value proposition are still generally described, not specific enough. However, this feature is greatly needed by the beekeepers and is a doable business idea.

Although there is no team right now working on the Business Model any more this business is very valuable for Indonesia because beekeepers pointed out their need of a flowering calendar. UNPAD team will focus on motivating the start-up to follow up on this business or develop it further themselves.

I rather see this as a non-profit idea, not sure if money can be made with that!

In other countries the application already exists, in fact it is almost certain that all honey cultivators have their own flower calendar, no application needed. So, it is relevant for new beekeepers, but not senior beekeepers.

This business model came up with interesting business idea. It is relevant with SAMS interest. However, it is not described in detail about the business status, and team behind the business, revenue and costs were not described.

Only valuable for ID? In my opinion it has the potential to be upscaled to other settings/ surroundings around the world. Nevertheless, the question from my perspective would be how expensive shall the app be? And how or if beekeepers are willing to buy such an app? Are they aware of the benefits of such an app? Will the app provide the different regions of ID with the most suitable plants/seeds which apply to this area to provide also the potential on extending bee business also in the agricultural field to generate a second income for them/their families? the flowering app also provides the opportunity for the beekeeper to sell its honey specifically based on the knowledge of current flowering - so different kind of honeys could be directly promoted by this app furthermore it provides the opportunity to the beekeeper to move with its bees based on flowering.

The Business Model shows good understanding of beekeepers needs. The services offered are highly relevant, yet with the limited customer basis, additional services for other clients might be necessary. In any case, the solution is simple, can be developed relatively cheap and requires limited human resources, I would encourage to host a hackathon to get the best developers work on this application.

2.1.2.5. Smart Bee

Smart Bee Is an application that can connect local beekeepers and beekeepers around the world. This application will provide the data needed by beekeepers and help them to optimize their honey production as well as sell their products directly to consumers without having to use conventional mechanisms that are too complicated. What is unique about this application is the ability to monitor the beehives remotely and be able to retrieve data about the health and performance of the bee colony. Besides that, the application could also be used to include first Decision Support Service aspects of SAMS to provide management information to beekeepers and to improve SAMS technology. It should also serve as a networking app to connect local beekeepers with other beekeepers from abroad.

- Status of the Business Model: ideation; freely available for further elaboration; developed by Ideathlon participants; contact person: no team (contact UNPAD team).
- Recommendations (according to evaluation and rating):

In the form of ideas and no team. Business ideas are only on the application level, not on the tool as whole as SAMS.

The business is poor developed because there is no team working on it anymore. Considering the summary of the business idea is not clear what the business idea focuses on - it is explained as app that connects beekeepers around the world, provides data to beekeepers, helps beekeepers to sell their honey, monitors the beehive remotely and supports the SAMS technology in "how to care and improve the SAMS monitoring system". It became clear that the business idea is based on SAMS and the SAMS objectives, thus the SAMS relevance can be seen as given. However, it is not well explained and elaborated.

2.1.2.6. Bee Virtual Ecosystem (BVE)

Bee Virtual Ecosystem is a technology-based beekeeping centre where bees are cultivated by beekeepers in an area. Bee Virtual Ecosystem helps to conduct virtual colony

surveillance. The Virtual Bee Ecosystem not only provides virtual colony surveillance features but also provides access for beekeepers to access beekeeping research, especially beekeeping journals. In the long term, the Virtual Bee Ecosystem will serve as a reference for bee research and innovative research around the world.

- Status of the Business Model: ideation; freely available for further elaboration; developed by Ideathlon participants; contact person: no team (contact UNPAD team).
- Recommendations (according to evaluation and rating):

The Business Model is poor developed because there is no team right now working on it. Moreover, the Business Model does not clearly point out on what it emphasized but mentions different topics and aims, e.g. bee research, honey monitoring via sound, provision of beekeeping products, developing an incubator regulating machine, scientific articles, being a beekeeping centre. There is also not a direct SAMS relevance.

In the form of ideas and there is no team. Business ideas are still unclear. If it works, it is good for research, but it does not explain the reciprocal benefits such as those obtained by beekeepers, Revenue stream does not relate to the main business to be developed.

2.1.2.7. Ruang Bermadu

Ruang Bermadu aims to educate the youth and create a greater awareness of bee related social and economic benefits and create a better understanding on interacting with bees

Ruang Bermadu is a business idea in the form of a chill-out area that provides a variety of processed honey products (ex: honey smoothies) for young people. In addition, it has an integrated room that has a wall of knowledge from the world of beekeeping, a corner of Indonesian honey products, and a special bee colony location to let the visitors experience interaction with bees.

- Status of the Business Model: ideation; freely available for further elaboration; developed by Ideathlon participants; contact person: no team (contact UNPAD team).
- Recommendations (according to evaluation and rating):

High SAMS relevance, but probably low market volume and low revenue stream.

In the form of ideas and no team. An idea about a cafe with honey-based products that has a concept while providing education and information about beekeeping. If it works, it is very good to increase the market for integrated products.

2.1.2.8. Dilema OKE!

Dilema OKE offers a bee monitoring tool along with an interface application which is also a sales platform for beekeeping products. Dilema OKE will later record data on the extent of honey bee production in producing quality honey, and the results of the data obtained can be accessed through this application. Dilema OKE is expected to help beekeepers to be more independent and empowered in developing their apiculture business.

- Status of the Business Model: ideation; freely available for further elaboration; developed by Ideathlon participants; contact person: no team (contact UNPAD team).
- Recommendations (according to evaluation and rating):

In the form of ideas and no team. Don't explain much about the IoT. Good ideas, but ideas like this have started a lot even though the market is not many who run this idea.

Idea based on bee monitoring - wants to connect beekeepers with sellers through an app. No user problem defined.

Relevance to SAMS and for the apiculture sector given as the business could be based on SAMS technology & and impacts modern beekeeping / supports knowledge exchange on modern beekeeping.

2.1.2.9. Masagi

Masagi is a business which empowers women in Indonesia, by providing trainings which relate to the production of honey-derived products and its good practice to women and therefore actively includes them in bee related activities to increase incomes and environmental conservation efforts. The processed honey is purchased directly from local beekeepers and to empower local communities. Masagi produces honey derived products such as honey jam, various honey cookies, Honey Lemon Ginger syrup, and others and some of product's profit are used for environmental conservation

- Status of the Business Model: Scale up; contact person: Ina Sawitri.
- Recommendations (according to evaluation and rating):

The Business Model is strongly based on SAMS, developed by UNPAD team, it is about honey derivative products and selling them; it empowers in particular women; marketing is very active; it is a result of the first UCD workshop in 2018; sustainability is given by UNPAD support and Bandung Bee Sanctuary connection; suggestion: need to create a better formula for e.g. the drinks, add traceability

This business is running already right now (status: established business), and actively market its product through Instagram and direct sales approach by WhatsApp. Relating to SAMS project, this idea could help beekeepers creating other derivatives product besides raw honey and could be done by the beekeeper's family. However, I found that the value proposition isn't unique enough. Also, the future plans of scale up is poorly described. Would love to see more of the future business plans and more information on product differentiation plans.

The SMEs that were born based on research; the first SMEs born from the SAMS project in the field of diversification of processed honey products. SMEs which focus on processed honey products. More product sales via WhatsApp messages than online marketplaces. The potential for business development is quite good because it has been spread in several souvenir outlets in the city of Bandung and also orders outside the city. In addition, Masagi also participated in a product exhibition at the 2018 AAA Conference in Jakarta. Has its own product formulator for product development.

Super idea, go on!

Only valuable for ID? In my opinion it has the potential to be upscaled to other settings/ surroundings around the world. Nevertheless, the question from my perspective would be how expensive shall the app be? And how or if beekeepers are willing to buy such an app? Are they aware of the benefits of such an app? Will the app provide the different regions of ID with the most suitable plants/ seeds which apply to this area to provide also the potential on extending bee business also in the agricultural field to generate a second income for them/ their families? the flowering app also provides the opportunity for the beekeeper to sell its honey specifically based on the knowledge of current flowering - so different kind of honeys could be directly promoted by this app furthermore it provides the opportunity to the beekeeper to move with its bees based on flowering.

Masagi is promising because the trial is long enough.

This is a good business model with respective SAMS relevance, and it is an already established business. This business improves good linkage between bee product producers and the end market by accessing quality honey. However, it didn't show how it makes differently from the conventional types of processing and how these skills trickle down to scale up the intervention.

The BM should elaborate further products in its growth strategy and improve quality/ traceability of the honey product itself. The key selling point remains vague.

2.1.2.10. Bulema

Bulema (budidaya lebah madu = honeybee cultivation) is a honey bee ecosystem with high economic value. There are several main concepts that have been raised in this business:

- Bee Farming;
- Edu Tourism;
- Social Innovation;
- Beekeeping Education.

The aim of Bulema activities is to increase public awareness related to beekeeping benefits and to increase the rate of new beekeepers / prospective beekeepers. Bulema collaborates with the Bandung Bee Sanctuary in developing its business.

- Status of the Business Model: ideation; freely available for further elaboration; developed by Ideathlon participants; contact person: Acep Jaelani.
- Recommendations (according to evaluation and rating):

Because it was born from a business competition funded by the Government for students, it caused the team formed to leave only one person.

At this time Bulema has collaborated with BBS.

The business can be seen as good developed, first implementation has been taken place and it is connected to Bandung Bee Sanctuary. Bulema offers honeybees training & education based-tourism services, right now only in Bandung (BBS) but it will be scaled up to other ID cities. The business was established in January 2020 and is supported by University of Padjadjaran and Ministry of Research, Technology, and Higher Education. It might be a promising business also in terms of financial aspects (entrance fee, business competitions, merchandise products, considering supporting schemes). The SAMS relevance is high in general and especially in terms of raising awareness on beekeeping.

2.1.2.11. Calakan

Calakan is a technology production house. A place for research and innovation in information technology that focuses on developing systems (web, mobile & API) and emerging technologies (Internet of Things, big data, etc.), which can produce technological solutions that have a social impact. The products that Calakan offers are consultation, software/website making, hardware construction, as well as IT system development services. One of their products is monitoring technology for Apis Cerana and assembled using a more affordable tech so the beekeepers will be able to afford this technology.

- Status of the Business Model: first implementation business; contact person: Rois Solihin.
- Recommendations (according to evaluation and rating):

The Business Model is good developed; first implementation has taken place. The SAMS relevance is good according to the criteria above; it can even be categorized as very good/ high because the Calakan monitoring system is based on the SAMS project's monitoring system and follows the same aims (modern beehives, reduction of beekeeping efforts, knowing about bees-health/ condition without opening the hive). Moreover, it is developed with and for local usage in ID and supports the SAMS project even beyond the project running time.

Calakan in the self-assessment still takes the perspective of the beekeeping monitoring tool that is being developed only, not as Calakan as a whole business unit. Businesses that focus on technological innovation, ranging from website creation, IoT technology, and others. Having a team member with a background / experience in the world of technology. In IoT monitoring technology in beekeeping, it can be said that the first (very difficult to find a source on the Internet) in Indonesia.

The business is in the status of exploring, prototyping and first implementation;

suggestion: marketing is not clear yet - it needs a good marketing concept and need more research.

I am not sure if I see this business in direct contact with customers. Maybe their customers are providers of hive (and other monitoring) systems.

The business has already started operations and is relevant with SAMS monitoring technology. There are about 4 staff working for the business. The project, however, didn't mention it aims to solve and how the service is offered to the customers.

Calakan is also promising and very interesting because it is the only Business team that offers a monitoring system and has a team behind it, and it is very connected to SAMS.

It provides the possibility to extend the market for such systems if beekeepers are aware of the benefits. Therefore, I miss the link how Calakan is promoting such system and creating such awareness on the beekeepers end that their daily work will be improved by those systems. Business idea is based on SAMS - upscaling. Open question is how the beekeeper is able to use the monitoring system/ data which is collected. Link to an app is missing (uptake of DSS idea?) Furthermore, the question on if the beekeeper is willing to buy such system is missing. Furthermore, following question rise:

- *how long is the lifetime of a system/ the parts?*
- *how is the maintenance of such a system considered?*
- *does Calakan only sells such systems or does it also provide a training/ set-up service for the beekeeper?*
- *will Calakan also be available "on call" for beekeepers in case something is wrong with the systems?*
- *where is the data stored?*
- *how is the data processed after monitoring device collects it?*
- *how will Calakan create the need at the beekeepers end for such systems?*
- *providing information on increased productivity/ less work by the beekeeper?*
- *set-up of beehives with systems and compared with beehives without systems?*

Developing modern beehives according to the new SAMS standards and distributing them locally would be great. Unfortunately, there seems no strategy to exists on how to reach clients and monetize the revenues. The necessary network should be elaborated further.

2.1.2.12. Honey Lab

Honey Lab is a socio-preneur company with local honey products that empower local beekeepers. They reinvest their profits to upgrade local beekeepers and their forests. The products offered by Honey Lab is 100% pure local honey from West Java local and local farmers products with green-social business concept.

- Status of the Business Model: establish business contact person: M. Rifqi Fajriansyah.
- Recommendations (according to evaluation and rating):

Already implemented business idea. High relevance for SAMS. High potential market volume.

The team is run by students, so it is constrained by the sustainability of the business when they must focus on their final project. This business is currently on break. Inspired by the business idea contest "Ideathlon" with the name "Rumah Bermadu" but changed its business model. Has received government funding in the form of Student Creativity Programs from the Directorate General of Learning and Student Affairs, Ministry of Research, Technology and Higher Education of the Republic of Indonesia.

2.1.2.13. Madu Baduy

Madu Baduy is a social enterprise empowering the Baduy ethnic (local ethnic of Banten Province). Baduy honey repacks the honey from the Baduy ethnic. The product offered by Baduy Honey is forest honey. This business is focused on increasing product value through its honey packaging.

- Status of the Business Model: first implementation business; contact person: Dede Sukriman.
- Recommendations (according to evaluation and rating):

The team is run by students, so it is constrained by the sustainability of the business when they have to focus on their final project. Focusing more on local values to empower ethnic Baduy, the team still does not meet the business needs, Promotion / marketing is still lacking.

Poor relevance for SAMS as the idea is purely based on creating appealing labels for honey and does barely include SAMS-related goals. Research and understanding of the problem/user needs: not profound; the solution to the identified problem is not thought through in depth; plan for the development of the business is idealistic. Nevertheless, the team seems to be highly engaged; they may lack more profound knowledge.

2.1.2.14. Honeymu

Honeymu is a local honey product that has its own beekeeping and offline store. They inform customers about convenience of being reseller, authenticity and honey availability, affordability and provides access to purchase the goods. The products that Honeymu offers are mellifera/cerana honeycomb, bee pollen, raw honey and multiflora honey.

- Status of the Business Model: established business; contact person: Anggi Bagus R.
- Recommendations (according to evaluation and rating):

This business idea is poorly developed and not unique enough. Many beekeepers developed this kind of product already.

When contacted the first time he had responded, but when contacted further to fill in further data so there was no response back. Assessment is only done based on BMC and through social media and online marketplaces.

2.1.2.15. Gudang Lebah

Gudang Lebah is a wholesale centre of bee products. They offer and inform people about pure products from bees. The products that Gudang Lebah offers are honey, royal jelly, bee pollen, propolis, and beeswax.

- Status of the Business Model: established business; contact person: Sutriyo.
- Recommendations (according to evaluation and rating):

Business scale is big enough when see the information contained on its website.

The business is poor developed, there is no team working on it anymore. The business idea seems to be: sell various types of pure and original beekeeping products, promote healthy benefits of beekeeping products (start a campaign for healthy lifestyle), be a trusted and reliable beekeeping product supplier and wholesaler centre. The idea tackles the ID problem of impure/ fake honey. Fake honey was also discussed in D2.3 Market Results. However, it is only another platform for selling beekeeping products, not very well elaborated and without a clear SAMS relevance.

2.1.2.16. Jaga Lebah

Jaga Lebah is designed to be a community/ start-up in Indonesia that focuses on bee conservation efforts through various ways. The main aim of Jaga Lebah is to increase people's understanding of the importance of bees for our life's. They focus especially on children and young people in urban areas as they become our future. Jaga Lebah also has slogan "Bee as a Pet", it uses trigona (stingless bee) as their main product.

- Status of the Business Model: business ideation (preparation for the first implementation); contact person: Octy Viali Z.
- Recommendations (according to evaluation and rating):

The Business Model has been developed by students from Mr. Rama; status: idea but good idea and actively working on it; it is about selling bee colonies, raising awareness, telling that bees are friendly and can be kept as "pets", target users: children (educational purpose).

High relevance for SAMS. The start-up still has to gather a lot of information about the needs of its customers (institutions) to create a good revenue stream in the future. Ideation status.

Still in the form of ideas / business ideas. More centred on the type of Trigona bee. High potential business ideas.

There is something critical to be said when it comes to selling "bee colonies" (or only hives?) to children. Nothing against very young beekeepers, but bees are definitively not a children's toy!

High relevance for improving the sector, creating awareness, supporting agriculture, improving environment and also by getting the government more on board; this could be sold to schools as interactive learning, aspects of pesticide using, health aspects for people etc. would be great included here; great option to also cooperate with training centers/ trainee programs/ TVET(?).

Jaga Lebah, a little difficult to integrate with SAMS tools, maybe relevant for further development but for now it is still difficult. Focus on colony sales.

The business is a good idea and relevant to SAMS, it is an ideation. The business concept helps to expand the participants in the sector. However, the limitation would be of small outreach and needs continuous behavioral change awareness creation and trainings. In this regard the business idea didn't show how the knowledge and skills are disseminated to the wider community.

The Business Model lacks fundamental information about the education sector and how educational materials can be introduced to the clients. It is very relevant, yet a clear strategy is missing in the description.

2.1.2.17. Madu Cantik

Madu Cantik (Macan) is a pure honey invention which is special from its taste, texture and nutrition.The products that Madu Cantik (Macan) offer is herbal skincare that is made from honey.

- Status of the Business Model: established business; contact person: Adi Wira S.
- Recommendations (according to evaluation and rating):

It is a thoughtful business; it is about honey beauty/ cosmetic products; the cosmetic products are produced by the start-up (raw product from beekeepers); start-up has other products; is interested in other apiculture businesses.

The Business Model is good developed; the business is already established. The SAMS relevance is also good; it can be categorized as high because the business is creating jobs and empowering women. Moreover, the business creates awareness of bee products in Indonesia and supports the increasing demand of a healthy lifestyle (= result of market research D2.3).

Active sales through an agent/ reseller, some of its reseller has more than 11,000 product sales. This business idea brings new color into apiculture sector through beauty products, thus increases people needs of bee products.

Everything that expands the market niches for bee products is welcome! I like this very much!

In line with SAMS value chain and business idea – it is not clear if the need for such products was really elaborated - so further elaboration on specific e.g. skin problems in ID/ Asian market/ around the world would be great as this would be the selling baseline - if such facts do not exist or are not highly requested business might not be of great success; provides potential to also open up honey related beauty farms/ stores such as massage stores.

Madu Cantik, established business, attractive business, trade is already running, filling the ecosystem of derivative products from honeybees, the team and sustainability are quite good.

The business status is already established and there are some experts behind it. Relevant to some. The business model, however, doesn't show the link between the honey suppliers and the MSE. The volume of production is not well stated to generate income to those involved in the beekeeping sector.

Business Model introduces honey and bee products to a new market with huge potential: skin care and health. This is very promising yet requires much more customer care/analysis.

2.1.2.18. Madu Bina Apiari

Madu Bina Apiari is a local honey product that empowers local forest beekeepers since 1980. They focus on the production of honey from beekeepers and train them about good beekeeping practices. The products that Madu Bina Apiari offers are honey, bee pollen, bee bread, and royal jelly.

Madu Bina Apiari is not a business developed during the SAMS project nor a new business. Unpad team encounter this business while searching for existing apiculture businesses through web-seminar and incubation activities and realized this business condition during the rating process.

- Status of the Business Model: scale-up business; contact person: Dianita K. Kartika.
- Recommendations (according to evaluation and rating):

This business is not a start-up/ SME, it has been running since 1980 and a rather huge impact on Indonesian Apiculture. Business owners have had experience in several APIMONDIA conferences for a long time.

Crafting and selling of Bee-products and education for the community. Hard to evaluate its potential as some details are lacking. Poor to good relevance for SAMS - direct use of SAMS not integrated in the business plan; focus rather on education and selling (but does not explain what type of education).

2.1.2.19. Laduni Mutiara Lestari

Laduni Mutiara Lestari is a group of Apis mellifera beekeepers from Cianjur, West Java. It has about 300 colonies but is always migrated (migratory beekeeping) outside the Cianjur area due to lack of food. Dreamed of owning a location for beekeepers in Cianjur and have started looking for cooperation with local government agencies to be able to use unused land so that it can be managed as a beekeeping site in Cianjur.

In marketing, they have collaborated with various local entrepreneurs in Cianjur to become honey sellers. In addition, they are also active in activities held by the West Java Provincial Forestry Service. One example was a participant in the Thrive Project, a project that was born from the collaboration of the Social Corporate Law Society (Socolas), Mongabay Indonesia (website from the US), The Local Enablers (a community from Unpad), IKA SKMA Jabar, and the West Java Provincial Forestry Service.

- Status of the Business Model: established business; contact person: Abdul Kodir.
- Recommendations (according to evaluation and rating):

The start-up deals with Apis melifera now, develops an apiary in a region (Ciannjur) where there is no apiary right now; have a niche market in ID: Apis melifera; working together with government; unique idea; maybe no potential to scale-up but scale-up motivation is given.

They started this business for quite a long time already (since 2012 I read). The fact that they are still exist and running the business means they're surviving. The potential of this business models lay on its team. Most of the team are beekeeper themselves and they are aware of cultivating forage for the bees and include it in their business plans. They also have unique customer segment, which is Cianjur's government officers and offer free delivery services for them. Unfortunately, I can't see their future. I'm curious of their plans to sustain their business. I think that's the only thing that missing from this business concept.

Have a plan/ dream to make a special beekeeping area in the Cianjur area. Is starting to raise bee cerana to reduce transportation costs. Potential to scale up is good because it can map relationships and potential in the area. Regarding the work of team members, they tend to be covered by just one person, so it is uneven, and the capacity building of the team members is limited. The product is currently only entered in several tourist outlets / souvenirs in Ciannjur.

This is a solid start-up aiming on producing honey for profit with imported Apis mellifera bees. That is how one starts a beekeeping operation!

Already existing business idea, but for the region it could provide income but in my perspective more or less on a small scale basis - no upscaling potential from my perspective based on this concept but as I think free shipping for governmental actors is a great idea to also raise awareness for the topic on their level and to may boost the apiculture sector.

Laduni, having its own colony, is still just a 'dream', not well realized, even so, it still needs something like this to complete the value chain.

The business is relevant with SAMS engagement and the business, engaging in the bee farm for almost a decade. This proves that they are surviving though there is no auditing about the profitability of the business. I didn't see fulltime workers unless the business owner runs it permanently. The price mentioned as willingness to pay by potential buyers is a bit expensive (7 and Euro) comparing to the existing international market. It was not described in the business whether the bee products are organic and targeting niche market or conventional one.

Government backed service.

2.1.2.20. Madu Primary

Madu Primary is one of the product lines owned by Primary Agro. This business operates as a honey reseller, rebrand and repack honey received from local beekeepers. Honey products sold by Madu Primary include forest honey, calliandra honey, multiflora honey and honeycomb honey.

- Status of the Business Model: established business contact person: Dandi Budiman.
- Recommendations (according to evaluation and rating):

Sales of honey from beekeepers supply around Bandung.

The business is good developed, first implementation has taken place. The business is about selling pure, good quality honey for affordable prices and very fast (e.g. 1 day in Bandung) from a reliable company. It tackles the ID problem of fake honey. The business was established in 2018 and has other products on the market (propolis and bee pollen). According to the given information the SAMS relevance is high in terms of jobs, women/ youth, dissemination of modern beehives, data transfer, production, reduce apiculture efforts. However, it does not become clear if the business really tackles all these SAMS objectives. The business is rather only selling pure honey as mentioned above.

2.1.2.21. Madu Hanjuang

Al Amin Hanjuang Honey is raw honey that is only filtered and does not go through any heating, centrifugal, or other processing processes. This business makes quality assurance the main point in running its business. So that the incoming honey supply must come from a trusted honey supplier. In addition, Al Amin Honey has also passed the quality test (SNI) in three trusted laboratories.

Apart from the quality of honey, there are several points that are the focus of this business, such as prices that must be affordable by the wider community, as well as honey packaging that is easy to carry on trips.

Honey Al Amin Hanjuang wants to make honey a unique souvenir from Indonesia, so packaging is one of the points that he wants to improve.

- Status of the Business Model: established business contact person: Aulia Sofia N.
- Recommendations (according to evaluation and rating):

Reselling idea; reason for starting this idea: pure honey selling; does quality control; for future: wants to make honey icon for ID and increase value of honey; connection with beekeepers: not known; but wants to sell honey also for good prices; products might be traced; good relationship with government (halal label); ambitious founder, might be sustainable; problem: team, need support.

The Business Model is good developed; it is an established business. The SAMS relevance according to the criteria is good. Considering the market results, the Business Model's relevance for SAMS can also be categorized as good too high for Indonesia because the business tackles the ID challenges of e.g. increasing demand for honey, good quality of honey without sugar and impure honey, supporting healthy lifestyle, affordable prices. However, the business is limited to ID market and ID challenges.

This business is a honey reseller business, in terms of channel is good enough, already has a permanent reseller and good relations with the local government to help develop its business.

The training activities are still attended by the owner, not delegated to the members, the team's capacity building is still lacking.

Has an advantage in the importance of the type of packaging used for honey products.

The impact on aspects of apiculture is still very limited.

Selling honey. That is the number one business in beekeeping!

Idea has potential due to regular quality checks - certification for honey could be linked to it - but also as the specific kind of honey are linked to health aspects - if such honey sorts are proven to be good for specific health issues it could have great export potential.

Hanjuang, honey reseller, the value is quite strong, boldly provides premium products, the website is not good, so branding is not quite good.

It is an established business selling bee products. This business didn't clearly show what relationship exist between the business and bee farmers; contract farming or prearranged price model or and other embedded relationship. In that case this business falls like any other SME that buys and resells bee products.

The reselling business is interesting but not innovative. I would expect to have a growth strategy as well as do much more in terms of certification/defending the unique selling point here (laboratory tested). This could potentially be added as a service to other resellers.

2.1.2.22. Bandung Bee Sanctuary

The Bandung Bee Sanctuary is an urban beekeeping start-up which is located around the city center of Bandung and sells honey, provides educational services and empowers research and communities. There are five main concepts raised in this business model,: Bee Farming, Edu Tourism, Social Innovation, & Eco Working Space.

Bandung Bee Sanctuary utilizes unused land that used to be a waste disposal location which was then transformed into a beekeeping site where various types of flowers could be planted. The impact resulting from the activities of the Bandung Bee Sanctuary is an effort to conserve the environment by restoring the function of abandoned and critical land that had once been a landfill back into green land. Launched on January 10, 2020 by the Chancellor of Padjadjaran University as a conservation and eco-technology-based social

entrepreneur by prioritizing training in honey bee cultivation, ecotourism, and honey bee maintenance in improving environmental quality and empowering the surrounding community.

- Status of the Business Model: first implementation business; contact person: Yoga R. Nugraha.
- Recommendations (according to evaluation and rating):

It is an established business (established January 2020). It has a high relevance for SAMS. Especially with addressing tourists, the revenue stream might be good.

Born because of UNPAD's involvement in the SAMS Project. It is an environment-based business which changes the location of illegal waste disposal into beekeeping locations. Collaborate with Bulema and Calakan in their activities. Selected to become 20 Start-up financed in the Hyundai Start-up Challenge. An Urban Beekeeping in Bandung. Bandung Bee Sanctuary is often used as model/example of business innovation in several UNPAD activities.

The Bee Sanctuary is an excellent symbol for the achievements during the SAMS project!

Great potential especially under educational facts, linkage to agricultural aspects (& environmental facts). Nevertheless, if and how huge the revenue could be is questionable as there is no unique selling point shown in the business idea.

BBS is very relevant, very important as a hub for the development of the West Java Beekeeping ecosystem, especially Bandung; very good for monitoring data and transfer of knowledge/ education; can be scaled up by making channeling further/ broader in partnership. The virtual tour held by BBS during this pandemic is very relevant.

It looks good and relevant to the environment conservation. This expands the new entrant to the sector. It has four full time staffs.

Sophisticated, commercial strategy and great network has a good understanding of the clients, customers. The revenue model needs improvement. Understand well the interconnectedness of bee keeping and address those needs from various angles.

2.1.2.23. Bio-N-Propolis

Bio-N-Propolis is a propolis product from research in the laboratory. The raw material is produced by Tetragonula spp. which is managed by the Bio-N Team in collaboration with local beekeepers. Bio-N is a health and beauty start-up with its roots in the Institute of Technology of Bandung (ITB). Bio-N highlights the importance of natural essences in health and beauty products.

- Status of the Business Model: established business; contact person: Yuanita Handayati.
- Recommendations (according to evaluation and rating):

Bio-Propolis is an excellent bee product from stingless bees that can be marketed globally! What research in the lab is made is not clear to me.

Propolis as one key within a business has great potential especially for health aspect but I miss a real concept for a business which I can't see here.

The business is developed based on research (beehive for trigona); have another product; need better marketing for propolis.

Bio N-Propolis has a great potency to be developed further since it established based on research. The product also has a good influence in apiculture sector, however the marketing strategy has not been maximized and their key partners are not yet mapped properly.

Based on the template they filled-in, Bio N-propolis needs to plan a more specific financial schemes to make the business sustain.

It is not very clear how they will sustain themselves, also the user and tackled problem/ service are not clearly described.

According to the market research (D2.3) the demand for propolis (as healthy lifestyle product) raises. The business is established; high SAMS relevance in terms of jobs, women, productivity etc. and demand for honey/ healthy products (=market result of ID).

Bio N Propolis because using trigone for the relevance of SAMS technology is still lacking

The business proposes one of the important products that could be marketed easily in the international market. The product is based on research and will be practicable. However, the business model needs a detail explanation about it.

Bee products are only one element of the business model and therefore the scaling effect on honey production and bee keeping in general is limited.

2.1.2.24. Wisata Petik Madu

Wisata Petik Madu is a beekeeping tour that was founded in 1978 which had the initial objective of providing lessons for beekeepers around the Lawang area but later developed into a tourist location due to the high interest of the community. There are three types of bees (A. Mellifera, A. cerana, and Trigona) that are cultivated at honey-picking tourism sites.

In addition to providing tours to see the conditions of beekeeping directly, this business also provides various types of bee products, beekeeping equipment, and bee-derived products. In addition, to support the tourism business, Wisata Petik Madu also provides restaurants and lodging.

Wisata Petik Madu is not a business developed during the SAMS project nor a new business. Unpad team encounter this business while searching for existing apiculture businesses through web-seminar and incubation activities and realized this business condition during the rating process.

- Status of the Business Model: scale-up business; contact person: Hariyono, S.E.
- Recommendations (according to evaluation and rating):

Excellent business emerging from family!

Wisata Petik Madu is very good for scale up of SAMS. Thus, it is more suitable to be a partner of SAMS.

The business installs knowledge and skills about beekeeping. This really helps for further expansion of the sector.

This business is not a Start-up/SME. It is established on 1980 and recognized as one of apiculture famous touristic place. The business concept is really great as it includes apiculture practices in several aspects like breeding, education, training, tourism, etc. impacts that brought by Wisata Petik Madu for apiculture sector is really good, especially in apiculture education field that provided for free by them. Unfortunately, from our observation through their social media and filled-in document (template, self-assessment and BMC), they still lack in market analysis in term of understanding customer needs. Their advantages is that they provide not only beekeeping products (honey, propolis, etc., but they also sell beekeeping equipment/machineries to support beekeeping management. Wisata Petik Madu has potential to become one of apiculture leader in Indonesia.

This is a large family business. They seem to own a large area of land and turn this into all-in-one apiculture business. They provide bee colonies, beekeeping tools, wide range bee products (not only honey), even provide agro-tourism, and workshops. The only downfall of this business is the new-coming challenges happening around the world, the covid19 situation.

It is a family business; running for a long time; filled out the partnership form (WP6); more suitable as partners; however, has good relevance for SAMS; one reason for not considering as SAMS business could be that it does not have a growth potential anymore because it is established, however their aim which is connected to the SAMS aim is: Increase the number of beekeepers and greening bee feed plants (this can be seen as the new/ innovative idea that fits also to the SAMS project).

This business has great potential especially for international travelers as some bee species may not existing in their home countries - under the fact of health aspect (bee air - lodging, bee sting treatment, beauty spa etc.) this would definitely work on big scale and would be easily replicable around Java/ other islands - if really pointing out the uniqueness of Indonesian bees, health facts etc. BUT must be based on sustainable aspects and no exploding tourism - international tourists are looking urgently for sustainable tourism aspects combined with health if locals will choose this as holiday option it is a bit questionable to me.

Not innovative as the revenue model seems to work, scaling potential is limited.

2.1.3. EU

The ten EU SAMS Business Models are:

2.1.3.1. Software solutions for beekeepers

Development of different software products to aid beekeepers in their beekeeping activities, e.g., DSS SAMS data display for beekeepers/ scientists, beekeeping log, online matchmaking platform for partnerships between beekeepers and technology providers. These products include mobile apps and web services in relation to the beekeeping sector.

- Status of the Business Model: ideation; freely available for further elaboration; developed by UNILV; contact persons: Armands Kviesis and Aleksejs Zacepins.
- Recommendations (according to evaluation and rating):

The Business Model is rather poor developed (no team/ start-up) and the Business Model is too general "software solutions" for "beekeeping need" (not defined which software solutions and which beekeeping needs); however, the SAMS relevance is good-high because the Business Model is a follow-up of the software solution figured out and started to develop during the SAMS project.

This business idea is potential and can heavily relate to SAMS products, but it is not unique enough. Need to craft more on the unique value propositions.

The idea is very related to SAMS and understandable software for beekeepers is needed but the BM is too unclear in this status; it is recommended to further developed the business by students and then sell it to companies; in Germany e.g. funds for this are available, software solutions are well accepted.

2.1.3.2. Power supply solutions for monitoring systems

Developing power supply options for monitoring systems, e.g., alternative energy solutions (solar power systems, wind power systems). Since monitoring systems can be placed in very remote areas, it is important to provide efficient power solutions, so the monitoring systems could run self-sufficiently by utilizing the alternative energy sources.

- Status of the Business Model: ideation; freely available for further elaboration; developed by UNILV; contact persons: Armands Kviesis and Aleksejs Zacepins.
- Recommendations (according to evaluation and rating):

The Business Model is rather poor developed (no team/ start-up); but the relevance for SAMS is high because the Business Model provides a solution for the often-discussed topic on power supply; power supply for remote monitoring systems is challenging because beehives are often in forests/ areas not easy to access. A business like this can support to overcome the challenges and is needed for remote monitoring systems like SAMS and others. Power supply is an important topic for ET and ID but also applicable in EU.

This concept is very relevant to solve the power supply issues in remote areas, but it is in a very early stage concerning establishment and organization.

The idea of power supply brings solution to the problem that we face during the SAMS project. Moreover, the market segments for this business idea is wide (not only limited in the apiculture sector), so the sustainability and financial of this business is more feasible.

Very good idea; could be applied to many other areas too!

Main thoughts are important, but I hardly can see the success factor within the business idea as such tools have not yet really boost the market/ are such as important for the sector as this topic would require as ground.

The need for a reliable power supply in the field is one of the most important needs until now, because it is one of the problems that must be resolved.

The business model is at its ideation stage, technical staffs behind the business is not described. The business plan should have been described in detail. Regarding demands, costs, scalability nothing was mentioned.

The Business Model is rather simple and logic. The customer segment is limited which influences the potential revenue. Also, existing solutions in the field of remote-measurement devices and off-grid energy are not elaborated enough. Nevertheless, the BM offers ample opportunities to be combined with other energy-services (e.g. lighting, animal fences, etc.) so the customer segment might be much broader. A more detailed analysis of existing solutions and their adaptation is required. The BM lacks an analysis of implementation risks/ constraints due to local environmental circumstances (e.g. dense forests without wind/sun in IDN). Nevertheless, the interoperability and relevance for sectors beyond apiculture makes this a highly relevant BM.

2.1.3.3. 3D Case for bee colony monitoring system[1]

Designing and printing a 3D casing for monitoring systems to be used in real environment. Such casing will provide water and dust protection for electronic components and adds aesthetic aspect.

- Status of the Business Model: ideation; freely available for further elaboration; developed by UNILV; contact persons: Armands Kviesis and Aleksejs Zacepins.
- Recommendations (according to evaluation and rating):

The Business Model is poor developed as it is only a draft and there is no team elaborating it. However, the SAMS relevance is high because during the HIVE implementation the project noticed that a case to protect the developed monitoring systems against environmental conditions is needed. The case should be a good one, not to have to change it often (e.g. as experienced during the project: the case has been changed several times). Moreover, it is assumed that a service like this (the combination of design of case and printing of case) is not available on the market. This is the USP of the Business Model: the combination of design of case and printing of case.
Furthermore, the SAMS relevance is even higher when combining the 3D case with offering a customized PCB (EU BM 4) because during the SAMS project it was experienced that a PCB designing, and printing service does not exist but that there is a need of it. Moreover, the SAMS relevance is high because the Business Model points out a SAMS solution that has been started to be developed during the SAMS project.

The idea is to have customized solutions - this will serve one of the identified needs - we identified that weather, traditions of building, culture, bee species etc. must be considered; with the customized solution these different needs can be considered.

This business idea in terms of idea is great, however for the business to enter the market and become sustain financial schemes is needed to be mapped further. Business Idea solves existing problem. However, the market volume is probably not very huge. High relevance for SAMS impact.

One of the unnecessary things that could work!

[1] BM "3D Case for Bee Colony Monitoring System" was combined with BM "Development of printed circuit boards for monitoring systems" to **"Customized 3D Case & printed circuit boards for monitoring systems"** to increase the SAMS relevance and to have an overall solution. This results from the evaluation and rating (step 2: UCD team discussion).

Main thoughts are important, but I hardly can see the success factor within the business idea for such a need; moreover, it is hard to see for me if such adaption of cases would require a long-life business behind or if the development of such case would mainly take place frequently/ seldom.

Customized 3D Case and PCB are very suitable for SAMS monitoring tools and beekeeping monitoring tools which cannot yet be mass produced (fabrication). This business idea is also in accordance with market needs and the experience of the SAMS team during the project as mentioned in the previous rating stage.

The business model seems to identify SAMS related technology. It is in the ideation phase. I am afraid it lacks detail market assessment.

The Business Model lacks proper analysis of the customer segment. With high investment costs (printer, skills development…) the revenue model remains weak. Only being limited to specific beekeepers who already use the SAMS monitoring system the number of customers might be too small initially. Also, alternatives are available at very low costs.

2.1.3.4. Development of printed circuit boards for monitoring systems[2]

The business idea is related to designing and printing customized circuit boards (PCB) based on monitoring system specifications. Besides the circuit board printing, this business also provides soldering of the necessary electronic components.

- Status of the Business Model: ideation; freely available for further elaboration; developed by UNILV; contact persons: Armands Kviesis and Aleksejs Zacepins.
- Recommendations (according to evaluation and rating):

The Business Model is poor developed because it is only a draft by UNILV. However, the SAMS relevance is high because during the SAMS project it was experienced that a PCB designing, and printing service does not exist but that there is a need of it. Moreover, the SAMS relevance is high because the Business Model points out a SAMS solution that has been started to be developed during the SAMS project.
Furthermore, the SAMS relevance is even higher when combining the customized PCB with the 3D case design and printing (EU BM 3) because during the HIVE implementation the project noticed that a case to protect the developed monitoring systems against environmental conditions

The business idea solves existing problems. However, the market volume is probably not very huge. High relevance for SAMS impact.

The idea is to have customized solutions - this will serve one of the identified needs - we identified that weather, traditions of building, culture, bee species etc. must be considered; with the customized solution these different needs can be considered.

One of the unnecessary things that could work!

Main thoughts are important, but I hardly can see the success factor within the business idea for such a need; moreover, it is hard to see for me if such adaption of cases would require a long-life business behind or if the development of such case would mainly take place frequently/ seldom.

[2] BM "Development of printed circuit boards for monitoring systems" was combined with BM "3D Case for Bee Colony Monitoring System" to **"Customized 3D Case & printed circuit boards for monitoring systems"** to increase the SAMS relevance and to have an overall solution. This results from the evaluation and rating (step 2: UCD team discussion).

Customized 3D Case and PCB are very suitable for SAMS monitoring tools and beekeeping monitoring tools which cannot yet be mass produced (fabrication). This business idea is also in accordance with market needs and the experience of the SAMS team during the project as mentioned in the previous rating stage.

The business model seems to identify SAMS related technology. It is in the ideation phase. I am afraid it lacks detail market assessment.

The Business Model lacks proper analysis of the customer segment. With high investment costs (printer, skills development…) the revenue model remains weak. Only being limited to specific beekeepers who already use the SAMS monitoring system the number of customers might be too small initially. Also, alternatives are available at very low costs.

2.1.3.5. SAMS data warehouse deployment and hosting

The Business is about providing services to deploy and maintain the SAMS Data Warehouse which has been developed during the SAMS project. It also includes user support to link different bee colony monitoring systems with the SAMS Data Warehouse.

- Status of the Business Model: ideation; freely available for further elaboration; developed by UNILV; contact persons: Armands Kviesis and Aleksejs Zacepins.
- Recommendations (according to evaluation and rating):

The Business Model is rather poor developed according to the summarized criteria because there is no team/ start-up/ SME working currently on it. However, the infrastructure for this Business Model on deploying and hosting the DW has been set up already during the SAMS project running time. Thus, the Business Model can be categorized as good developed. Moreover, the SAMS relevance is high because the DW has been already developed during the project and its deploying and hosting ensures that the SAMS project keeps on/ will have further impact beyond the project lifetime. The UVP is that the DW allows to link any general bee colony monitoring hardware to it. Many other web services available on the market are only linked to a specific hardware.

High relevance to SAMS and the apiculture sector as it is based on the idea of developing & using the DW and monitoring technology. Lacks a financial concept.

It is strongly connected to the EU Business Model "Software Solutions for Beekeepers", maybe some software solutions that are interacting with the DW can be included into this Business Model because customers want to have an overall solution. The DW is valuable, algorithms were already developed; it is open source and should be further elaborated by any start-up.

2.1.3.6. Observe your HIVE[3]

The business idea enables the customers to observe all relevant data in a beehive (weight, flight activity, acoustics) in real time via the HIVE monitoring system. An additional camera would also be possible. The business idea is based on existing projects which offer to adopt a

[3] BM "Observe your Hive" was combined with BM "Monitoring of bee colonies for queen breeding" and BM "Rent a HIVE" to **"Beehive Monitoring System"** because all three business ideas are about beehive monitoring systems. The combination of the three ensures to provide an overall and successful solution. This results from the evaluation and rating (step 2: UCD team discussion).

bee colony, e.g. https://www.planbeeltd.com/. However, usually there is no direct access to the hives rented by the customer. The advantage of this SAMS business idea is that the customers can always observe their colonies in the beehives which they are renting, and this is a considerable added value compared to an anonymous sponsorship.

- Status of the Business Model: ideation; freely available for further elaboration; developed by UNIKAS; contact person: Sascha Kirchner.
- Recommendations (according to evaluation and rating):

The business model is rather poor developed that can be explained by the fact, that there is no team/ start-up/ SME working on it. But it should be pointed out, that the Business Model shows high SAMS relevance, since it involves further usage/ ensures sustainability of the developed HIVE system in order to observe bee colonies.

Very relevant with SAMS project, as a matter of fact this idea is potential good business idea, unfortunately it's poorly developed.

BMC is not clear enough, but the idea is nice - could be a good campaign for beekeeping/ an information tool for public, must be further developed.

Recommendations for the combined Business Models (6. Observe your Hive; 7. Monitoring of bee colonies for queen breeding; 8. Rent a Hive) to BM **Beehive Monitoring System**:

The UCD and Business Team decides/ recommends combining the three developed Business Models (6. Observe your HIVE; 7. Monitoring of bee colonies for queen breeding; 8. Rent a HIVE) because they are very similar to each other and are complementary.
However, the Business Models are poor developed because there is no team working on it right now. First implementation took place because the business idea is based on the SAMS HIVE monitoring system. The HIVE system, used for this business idea, can assist beekeepers in general beekeeping decisions and also in their queen breeding activities: with the help of sensor data, desired breeding traits can be detected earlier and more precisely. Thus, the SAMS relevance is high. Through this business idea the SAMS HIVE monitoring system would be used further as it has been used within SAMS (for general beehive monitoring) and would be scaled-up to a specific field: bee breeding.
The Monitoring Business Idea is also connected to the Data Warehouse architecture idea (EU BM 5), collaboration is possible.
The combination of the Business Models regarding the Monitoring system (general observing; special aspect: queen breeding and infrastructure idea: renting) must be defined more precise.

An all-in-one start-up. The one original idea is missing!

It is in line with SAMS thought; nevertheless, it is missing: if such tool is required by big scale beekeeper/ queen breeders especially since quite a few of such systems/ Business are on the market already - no unique selling point becomes clear for me. Question on renting vs buying such system is coming up, and the benefits of such systems/ for user is not becoming clear for me.

This Business Model is more likely to be the most acceptable and mature concept for monitoring system.

The business model is holistic and combines three aspects of the intervention. the idea helps to access beehives. However, the professionals behind the business are few and other source of income to the start-up is not identified.

This Business Model includes three components: hive observation system for rented beehives, monitoring for beekeepers, and queen breeding. The BM has a clear customer segment in mind, technology is already available, and beneficiaries are defined. The missing elements of the BM are a clear revenue stream analysis and analysis of the size of potential customers. Added value through the research component remains weak, as the end-users benefit of sharing hive data is unclear.

2.1.3.7. Monitoring of bee colonies for queen breeding[4]

The HIVE monitoring system can assist beekeepers not only in general hive management but also in their queen breeding choices. With the help of sensor data, desired queen breeding traits can be detected earlier and more precisely.

- Status of the Business Model: ideation; freely available for further elaboration; developed by UNIKAS; contact person: Sascha Kirchner.
- Recommendations (according to evaluation and rating):

The Business Model is poorly developed, mainly because there is no real team/ start-up/ SME behind it. The Business Model shows rather high SAMS relevance by applying already developed HIVE system to assist bee breeders. However, the Business Model does not clearly point out what kind of data the system collects and analyses to assist the breeders in their work, hence customer needs and impact on apiculture sector is also not mentioned.

It is poor developed because there is no team working on it right now. However, first implementation took place because the business idea is based on the SAMS HIVE system. The HIVE system, used for this business idea, can assist beekeepers also in their breeding activities: with the help of sensor data, desired breeding traits can be detected earlier and more precisely. Thus, the SAMS relevance is high. Through this business idea the SAMS HIVE monitoring system would be scaled-up to other branches/ fields: bee breeding.

Recommendations for the combined Business Models (6. Observe your Hive; 7. Monitoring of bee colonies for queen breeding; 8. Rent a Hive) to BM **Beehive Monitoring System**:

It is in line with SAMS thought; nevertheless, it is missing: if such tool is required by big scale beekeeper/ queen breeders especially since quite a few of such systems/ Business are on the market already - no unique selling point becomes clear for me. Question on renting vs buying such system is coming up, and the benefits of such systems/ for user is not becoming clear for me.

[4] BM “Observe your Hive” was combined with BM “Monitoring of bee colonies for queen breeding” and BM “Rent a HIVE” to **“Beehive Monitoring System”** because all three business ideas are about beehive monitoring systems. The combination of the three ensures to provide an overall and successful solution. This results from the evaluation and rating (step 2: UCD team discussion).

The UCD and Business Team decides/ recommends combining the three developed Business Models (6. Observe your HIVE; 7. Monitoring of bee colonies for queen breeding; 8. Rent a HIVE) because they are very similar to each other and are complementary.
However, the Business Models are poor developed because there is no team working on it right now. First implementation took place because the business idea is based on the SAMS HIVE monitoring system. The HIVE system, used for this business idea, can assist beekeepers in general beekeeping decisions and also in their queen breeding activities: with the help of sensor data, desired breeding traits can be detected earlier and more precisely. Thus, the SAMS relevance is high. Through this business idea the SAMS HIVE monitoring system would be used further as it has been used within SAMS (for general beehive monitoring) and would be scaled-up to a specific field: bee breeding.
The Monitoring Business Idea is also connected to the Data Warehouse architecture idea (EU BM 5), collaboration is possible.
The combination of the Business Models regarding the Monitoring system (general observing; special aspect: queen breeding and infrastructure idea: renting) must be defined more precise.

An all-in-one start-up. The one original idea is missing!

This Business Model is more likely to be the most acceptable and mature concept for monitoring system.

The business model is holistic and combines three aspects of the intervention. the idea helps to access beehives. However, the professionals behind the business are few and other source of income to the start-up is not identified.

This Business Model includes three components: hive observation system for rented beehives, monitoring for beekeepers, and queen breeding. The BM has a clear customer segment in mind, technology is already available, and beneficiaries are defined. The missing elements of the BM are a clear revenue stream analysis and analysis of the size of potential customers. Added value through the research component remains weak, as the end-users benefit of sharing hive data is unclear.

2.1.3.8. Rent a HIVE[5]

In order to obtain more bee data from different regions, the HIVE monitoring systems are loaned to interested beekeepers. The received data will be evaluated and can be used by both sides (scientific and application-oriented).

- Status of the Business Model: ideation; freely available for further elaboration; developed by UNIKAS; contact person: Sascha Kirchner.
- Recommendations (according to evaluation and rating):

[5] BM “Observe your Hive” was combined with BM “Monitoring of bee colonies for queen breeding” and BM “Rent a HIVE” to **“Beehive Monitoring System”** because all three business ideas are about beehive monitoring systems. The combination of the three ensures to provide an overall and successful solution. This results from the evaluation and rating (step 2: UCD team discussion).

The Business Model is poorly developed (no team/ start-up/ SME working on it). The business idea involves already developed HIVE system hence the SAMS relevance can be considered as high. Although the status of the Business Model is first implementation, it does not clearly state the identified problem, nor it points out the customer needs and the impact on apiculture sector.

The business idea is 100% from what UNIKAS does in the SAMS Project.

The BM is in line with the initial SAMS intention to collect data from different regions. To rent the monitoring system is rather an infrastructure idea how to promote the monitoring system and can hardly survive on its own.

Recommendations for the combined Business Models (6. Observe your Hive; 7. Monitoring of bee colonies for queen breeding; 8. Rent a Hive) to BM **Beehive Monitoring System**:

The UCD and Business Team decides/ recommends combining the three developed Business Models (6. Observe your HIVE; 7. Monitoring of bee colonies for queen breeding; 8. Rent a HIVE) because they are very similar to each other and are complementary.
However, the Business Models are poor developed because there is no team working on it right now. First implementation took place because the business idea is based on the SAMS HIVE monitoring system. The HIVE system, used for this business idea, can assist beekeepers in general beekeeping decisions and also in their queen breeding activities: with the help of sensor data, desired breeding traits can be detected earlier and more precisely. Thus, the SAMS relevance is high. Through this business idea the SAMS HIVE monitoring system would be used further as it has been used within SAMS (for general beehive monitoring) and would be scaled-up to a specific field: bee breeding.
The Monitoring Business Idea is also connected to the Data Warehouse architecture idea (EU BM 5), collaboration is possible.
The combination of the Business Models regarding the Monitoring system (general observing; special aspect: queen breeding and infrastructure idea: renting) must be defined more precise.

An all-in-one start-up. The one original idea is missing!

It is in line with SAMS thought; nevertheless, it is missing: if such tool is required by big scale beekeeper/ queen breeders especially since quite a few of such systems/ Business are on the market already - no unique selling point becomes clear for me. Question on renting vs buying such system is coming up, and the benefits of such systems/ for user is not becoming clear for me.

This Business Model is more likely to be the most acceptable and mature concept for monitoring system.

The business model is holistic and combines three aspects of the intervention. the idea helps to access beehives. However, the professionals behind the business are few and other source of income to the start-up is not identified.

This Business Model includes three components: hive observation system for rented bee hives, monitoring for beekeepers, and queen breeding. The BM has a clear customer segment in mind, technology is already available, and beneficiaries are defined. The missing elements of the BM are a clear revenue stream analysis and analysis of the size of potential customers. Added value through the research component remains weak, as the end-users benefit of sharing hive data is unclear.

2.1.3.9. HIVE as a flexible monitoring tool

The HIVE monitoring system is a very flexible sensor monitor system which can also be used for other scientific questions. The system will be equipped with appropriate sensors and the control software is adapted according to the requirements. An example could be the long-term measurement of nitrate contents of surface waters.

- Status of the Business Model: ideation; freely available for further elaboration; developed by UNIKAS; contact person: Sascha Kirchner.
- Recommendations (according to evaluation and rating):

The general approach is interesting - to open up the monitoring system to other branches and research fields; only concern: how will this be developed (important sensors for other insects will be also developed?) and how promoted?

The Business Model is poor developed (it is only a potential business idea, there is no team; it lacks concrete information about customer needs, market research, financial aspects). There is no link/ relevance for the apiculture sector. However, the business is based on the SAMS HIVE monitoring system - the idea is that the SAMS Hive system is a very flexible sensor monitor system, which can also be used for other scientific questions (example: long-term measurement of nitrate contents of surface waters). This is in line with the GA "Business may range from classical Api management [...] bee management solutions for different insects and animals." Therefore, with this business idea the SAMS HIVE monitoring system would be further developed and scaled-up to other areas/ research fields.

According to the score, the Business Model is not developed at all, mainly because there is no team/ start-up/ SME working on it. The Business Model does not have a direct SAMS relevance, only the HIVE system is mentioned, that can be adjusted to monitor other parameters. The potential problem is identified in general terms and does not provide any specifics/ give a concrete insight.

This should be for scientific research, and there these systems are usually self-made/ customized. I do not see a big market here, except schools, colleges, universities.

Poorly developed business plan, no new idea for a business included as such systems already exist and there is no uniqueness about this one.

The ideas related to monitoring system Business Models (this one, the A buzzy lesson and Monitoring system) are similar. For this Business Model the idea is too general, so its position when compared to A buzzy lesson and Monitoring system, it is in the last position. But it is useful for research purposes.

The business model is prepared with SAMS relevance and appropriate. The status of the model: not yet tested how it works. The connection of the business model to the apiculture is not clear. It was mentioned as others. Customer needs were not assessed, or literature review was not made that support the business. Willingness to pay of the potential customer is not assessed. In a nutshell, the concept is good but not well prepared.

Even though the example for water-monitoring is mentioned, it remains unclear why data should be collected and how that data leads to improved decision making. Also, competitors and other existing technologies are not analysed appropriately. The BM does not elaborate the specific benefits of a remote monitoring system for a relevant sector, other than bee hive monitoring.

2.1.3.10. A buzzy lesson - Providing monitoring systems and bee colonies to educational institutions

Beehives (incl. colonies) with a (SAMS) HIVE monitoring system will be sold to schools, universities, beekeeping training sites or other educational institutions. Depending on the needs of the customers, the start-up manages the sold bee colonies and gives regular talks for the students, or only provides the systems and service in times of needs. The customer buys the product/service to improve their course offerings, to teach bee biology and to teach the students how to analyse data on a living system right outside the building. The students further learn to interact with social insects and animals in general.

- Status of the Business Model: ideation; freely available for further elaboration; developed by UNIGRA; contact person: Kristina Gratzer .
- Recommendations (according to evaluation and rating):

The Business model score suggests that it is a poorly developed model, because of the fact that there is no real team/ start-up/ SME behind it. Overall the business idea shows a high SAMS relevance, since the key activities include manufacturing of modern beehives together with SAMS monitoring systems (including data warehouse part). Empowering youth and creating of new jobs are also facts worth mentioning, which are covered by the business idea and are in high relevance to SAMS.

Relevance for SAMS as based on providing monitoring systems and bee colonies to educational institutions & empowering youth. Lacks a financial concept and user research/ not researched if realistic that universities pay a start-up for the service.

I think that schools are the main target group. Other mentioned institutions are less likely to invest money on this.

Great potential especially went it comes to the fact in combining it with lessons for kids, families etc. - raise awareness for environmental facts, importance of livestock, provide potential also for e.g. holiday camps on increasing "back to the nature aspect".

Poorly developed!

The business idea is relevant with/ for SAMS. It focuses on bee technology production and education and enables the participation of youths and women. However, it requires to be prepared better.

The BM adds to the experience of the SAMS project and provides the potential to scale and invest in a bottom-up change process. Yet, the revenue model remains vague and needs further clarification/ improvement: who is going to pay for what service, why? The identified customers are very broad, and the necessary incentive structure needs further elaboration. Nevertheless, educating young people in bee keeping and the respective need to monitor their health is important.

2.2 Identification of Most Promising Ones

Within the business development activities, UNPAD and ICEADDIS together with start-ups, SMEs and students as well as UNILV, UNIKAS and UNIGRA developed 54 SAMS Business Models. In order to identify the five most promising SAMS Business Models per country and one for EU, the UCD group (team members from GIZ, UNPAD, ICEADDIS, CV.PI, UNILV and an AB member from ICEBAUHAUS) set-up an evaluation and rating process in three steps:

- **Step 1: Cross-country evaluation**

  Each Business Model has been cross-country evaluated by two members of the SAMS UCD team in July 2020 according to the following four criteria (1) the business concept, (2) the impact, (3) the team structure and (4) the start-up/ SME/ team in general.
- **Step 2: Virtual discussion within the UCD team**

  Beginning of August 2020, the SAMS UCD team started to discuss all business models and evaluations to make a shortlist. As a result, ten Ethiopian, ten Indonesian and five EU Business Models have been preselected as possible most promising ones. Those have then been forwarded to the experts (step 3) for final identification.
- **Step 3: Expert-rating**

  In August 2020 five business experts were nominated, who finally identified the most promising Business Models considering (1) the country context, (2) scale-up potential, (3) status of development, (4) apiculture relevance, (5) SAMS relevance, (6) feasibility (competition, trends and environment), (7) previous performance of the start-up/ SME/ business team and (8) the state of the art of the idea (short, medium, long-term view); the five Business experts are:
  - Stefanie Schaedlich: project coordinator of SAMS – Smart Apiculture Management Services; GIZ
  - Robert Brodschneider: project member of SAMS – Smart Apiculture Management Services and bee expert; UNIGRA
  - Gustaff Harriman Iskandar: member of the SAMS Advisory Board in Indonesia as founder of Common Room Networks Foundation
  - Molla Jember: representative for the SAMS Advisory Board Ethiopia
  - Johannes Anhorn: GIZ Business Expert, Innovation Factory

The most promising SAMS business models, the result of the three-step selection, are shown in Table 4.

Table 4 Most Promising SAMS Business Models

Country	Most Promising SAMS Business Models
Ethiopia	Anaby by Anabi
	Daemar by Daemat
	Birzz by Yiblu
	MbeeHive by MbeeHive
	Kekros by Kekros Ethiopia
Indonesia	Masagi by Masagi
	Madu Cantik (MaCan) by Herbal Khansa
	Madu Hanjuang by Madu Hanjuan
	Bandung Bee Sanctuary by CV. Suaka Lebah Bandung
	Laduni Mutiara by Apiary Laduni Mutiara
EU	Beehive Monitoring System (merged of Observe you Hive, Monitoring of Bee Colonies for Queen Breeding, Rent a Hive) by UNIKAS

However, all 54 SAMS Business Models are promoted on the SAMS website and on SAMSwiki, the identified most promising SAMS Business Models are highlighted. Moreover, they are supported regarding funding, licencing and certification in close cooperation with the associated participants and the business partnership network (in WP6, task 6.1). Therefore, the national partners UNPAD and ICEADDIS are in close contact to them, provided them the feedback (see chapter 2.1), identified important funding, licencing and certificate sources and forwarded the suitable options to them – all funding, licencing and certificate sources are also available on the SAMS website and on SAMSwiki. The option of joining the SAMS business partnership network (set-up in WP6) was also directly promoted towards the most promising SAMS Business Models.

3. Business Recommendation

This chapter reviews the target country readiness in regard to adopt the SAMS Business Models. Therefore, main aspects to tackle are identified and business recommendations for possible further apiculture business model are drawn in correlation to the most important findings of D2.3 Results of Market Surveys and the UCD research, done during the project (see D2.2 UCD Results and Lessons Learnt).

3.1 Country Readiness

The business development of the apiculture sector is influenced by country readiness. Be it the consumers, producers, governments, start-ups, or other stakeholders, their readiness level influences each other. As mentioned in D3.6 Report on Data Communication, several factors indicate country readiness, e.g. the maturity of the apiculture industry, government support, and age structure (children and young adolescents, the working-age population, and the elderly population). The more mature the apiculture sector in one country, the bigger the support given by the government, the more resources flow, the more flourishing the industry will be. The bigger the working-age population in one country, the more labour available, the more industries are thriving. The working-age population factor is believed as one of the main

factors that determine the growth of the creative industry. In 2018, the working-age population in Ethiopia was 55.26%, in Indonesia 67.59%, and in EU 64.69%.

3.1.1. Ethiopia

Currently beekeeping is mostly practiced by traditional methods and the production volume is significantly lower than the market demand. However, there is a favorable environment to increase the production of honey and other bee products across the country. This is a very good opportunity to adopt technologies like SAMS in the apiculture sector/ industry. Comparatively this opportunity requires low financial entry barrier for SMEs and start-ups. This will make it also beneficial to tackle other challenges in the country like empowering youth and women. Despite this possibilities there is a critical point on getting a consistent digital communication service to implement digital tools like SAMS in the Ethiopian industry frame. The potential resources available in the country are very relevant to influence policy makers, it is estimated in the near future that the ICT services for agriculture will improve.

3.1.2. Indonesia

Most of the developed apiculture business sector in Indonesia nowadays is dominated by honey-based commodity (e.g. pure/ raw honey and honey derivative products). While it proves that the demand streams are steady and still increasing, support for apiculture industries is still lacking, be it support from government and other stakeholders as well as from businesses that support beekeeping management. As identified in the early stage of the user research in 2018 by CV. PI: “Support from government for beekeepers has gradually decreased. Combined with the unsynchronized policies from across relevant ministries, beekeepers struggle to create fit ecosystem for beekeeping”. This gap of demands and support system are something that needs to be closed. As somehow challenging, this could mean opportunities as well. There is a necessity of some business or other solutions that could help apiculture sector in Indonesia leverage its productivity and quality significantly.

Indonesian beekeepers also have problems in mitigating colonies absconding and swarming. Referring to the beekeeper (end-user) needs assessment (see D2.2 UCD Results and Lesson Learnt), the prioritized beekeeper need is to make sure that there is no bee colony absconding, despite the uncertainty of the seasons, forage, and pests’ threat. Beekeepers have their own way to overcome this need. At this time, they rely on analogue methods through tacit knowledge in beekeeping. Technology has not been considered before as one of the solutions. The idea brought by the SAMS project had shed some light to beekeepers and other apiculture stakeholders that involvement of technology to leverage beekeeping activities is possible. The ability of Indonesian beekeeper needs to be solved by the SAMS HIVE system and SAMS DSS data display for beekeepers recorded in the assessment, and the technology policies that focus on 4IR (Fourth Industrial Revolution) shows an opportunity to adopt technologies like SAMS in their business; even though it needs time to successfully adopt because this approach is only favourable by new and young beekeepers, while the Indonesian beekeepers are dominated by senior ones who are mostly not technologically literate (see D2.3 Results of Market Survey).

3.1.3. EU

The EU SAMS Business Models are dealing with logistics/ supply, software and hardware, smart hives/ hive monitoring systems and education. Especially the technology based business models are in line with EU interests.

In EU, since 2003 there have been several research projects with the aim to gather further insights on the fact of declining bee colonies.[6] Technologies, like the SAMS monitoring system can be used as a tool to help identify e.g. causes to bee colony decline by providing reliable data sets and therefore add value to the beekeeping sector. Currently, there are many monitoring systems which are market ready – a list of such systems is available here. Several of them are located in Europe, such as Arnia, BeeWise, B-Keep, Connected Beehive, to name a few.

To strengthen the beekeeping sector, EU has also funds available for apiculture activities, including research, monitoring, trainings etc. In EU, around 240 million EUR are spent on national apiculture programmes for the years 2020-2022, which is an increase of 11% of the funds compared to 2017-2019.[7] This shows that the EU provides a great environment for the SAMS Business Models. Therefore, it is highly recommended to further elaborate them.

3.2 Main Aspects to Tackle

In the following the main aspects to tackle per country are pointed out.

3.2.1. Ethiopia

Within the SAMS research phase several challenges have been identified in the apiculture industry that blocks the industry from reaching its potential in the country. Some of the main notable challenges for the apiculture in Ethiopia are:

- Beekeeping activities remain in a traditional manner, even though there is a great demand for honey and honey products.
- Skill gap to operate modern beehives and the lack of consistent beekeeping equipment supply.
- Low awareness of beekeepers on how digital tools can improve beekeeping practice and lead to better production performance.
- Adulteration of honeybee products (the quality of the honey scores, the highest rating on the decision influence factors of consumer preferences).
- Packaging quality, as most honey containers, especially the plastic ones, are not considered as a good quality impression for honey consumers.

[6] Part II: Overview of the apiculture sector (2013): Evaluation of the CAP measures related to apiculture Agriculture and Rural Development DG- Final Report. URL: https://ec.europa.eu/agriculture/sites/agriculture/files/evaluation/market-and-income-reports/2013/apiculture/chap3_en.pdf (access: 15.01.2020)
[7] European Commission Website (2020): https://ec.europa.eu/info/food-farming-fisheries/animals-and-animal-products/animal-products/honey_en (access: 02.10.2020)

- Labelling of bee related products, as the labels on honey containers are not standardized and there is no regulating agency for quality assurance; as a result of this, honey consumers are not confident to buy honey and honey products because they do not trust any honey label on the honey packaging.
- Very little value adding bee products in the market, but there is rich demand for honey products in the urban market.
- Agrochemicals are killing bee colonies and put a negative impact on the honey production capacity.
- Lack of proper collection, storage, and transportation facilities.
- Illegal cross border honey trade.

3.2.2. Indonesia

Based on the UCD process, assessment, and Focus Group Discussions that have been carried out since 2018, the following information were captured as challenges in the beekeeping sector in Indonesia:

- Missing governmental actors as there is no government agency that specifically deals with beekeeping and its products.
- Missing quality regulations for bee related products, as there is no government agency/ institution appointed by the government to guarantee the quality of bee products.
- Climatic conditions make honey high in water content, so it is necessary to carry out further processing if it is to enter the international market because the local market still tolerates higher moisture content (around 20%).
- Traditional beekeeping vs. modern beekeeping as beekeeping in Indonesia is still dominated by traditional beekeeping due to the dominance of senior beekeepers.
- Missing market regulations, as there is no standard price for bee products issued by government.
- Government policies are often contrary to the practice of beekeeping.
- The need for bee feed has not yet become the focus of both the government and other stakeholders (limited importance of bee forage awareness).
- Public knowledge gaps as most people still think that bees are insects that destroy plants, so there are farmers who keep bees away, even though bees can help the pollination process[8].

3.2.3. EU

Business models dealing with beehive monitoring and data are relevant for scientists of different disciplines, e.g. bee scientists, plant specialists, climate scientists (see also D2.3 Results of Market Survey and D6.3 Transfer Study on Data Utilisation). Moreover, such business models are in line with the EU interest in supporting and strenthening the beekeeping

[8] Ali Agus, 2015: https://ugm.ac.id/id/berita/10481-sumber-pakan-lebah-madu-perlu-dikembangkan

sector (see chapter 3.1.3). However, on the one hand, in terms of SAMS, the challenge is to further elaborate the developed EU SAMS Business Models and make them market ready. On the other hand, in general for Europe, the challenge is not to overwhelm the market with similar solutions.

3.3 Recommendations for future apiculture business models

Based on the information provided in the previous chapters and the D2.3 Results of Market Surveys the following recommendations for future apiculture business models are drawn for Ethiopia, Indonesia and the EU.

3.3.1. Ethiopia

Beekeeping is a well-established practice in Ethiopia, but it is limited to few mixed farm holders who mostly use traditional methodology. Thus, the total production is a small fraction of the potential capacity. The major bottleneck to improve this problem is the skill gap to operate modern beehives and the lack of consistent beekeeping equipment supply. The second notable challenge is low awareness of beekeepers on how digital tools can improve beekeeping practice and lead to better production performance.

Recommendations for future apiculture business concept in Ethiopia are:

- greater product range of education and training services for traditional beekeepers about the benefits and management of modern beekeeping;
- greater product range of capacity building activities about modern beekeeping equipment production and digital tools integration to the apiculture industry for SMEs and start-ups;
- quality material and manufacturing – good quality modern hive construction and beekeeping accessory equipment supplier establishments;
- establishment of a well-integrated market value chain for the apiculture industry;
- development of supporting policies and mechanism for the start-ups and SMEs (relevant for associations) in the apiculture industry;

3.3.2. Indonesia

Based on the D2.3 Results of Market Surveys, there are several aspects on which new business ideas could be developed:

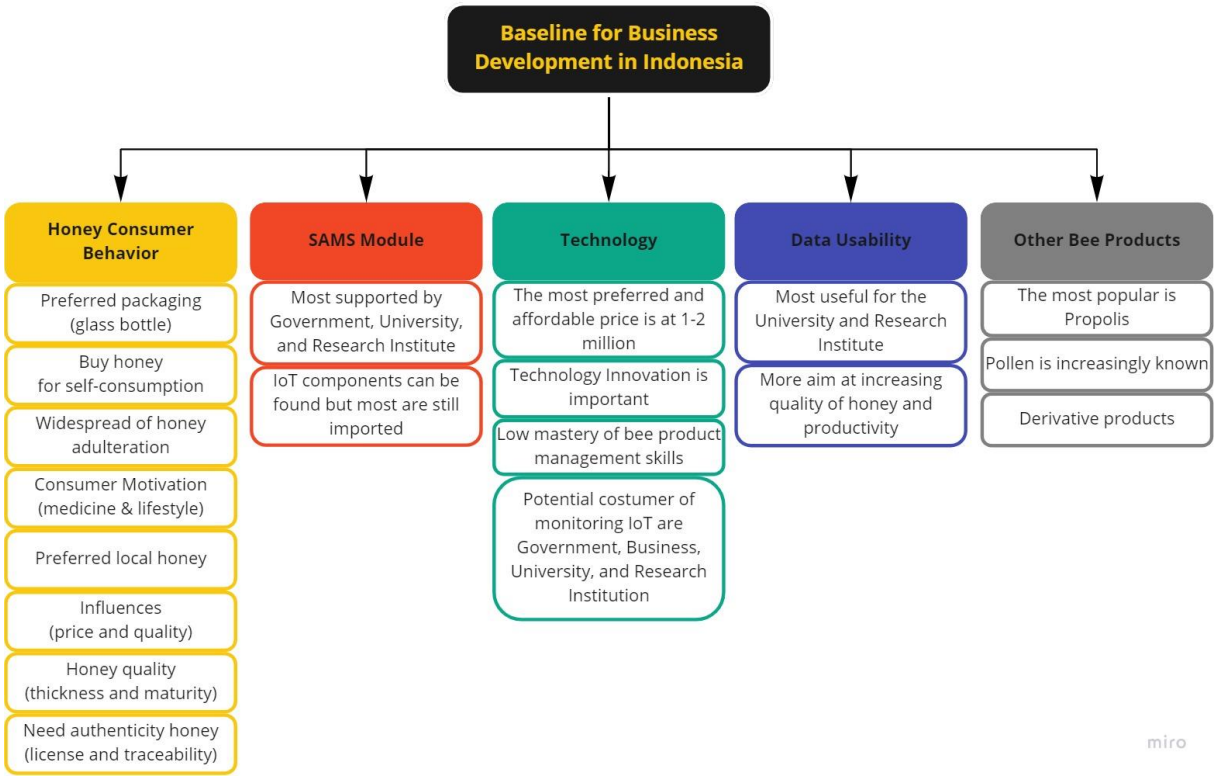


Figure 4 Baseline for Business Development in Indonesia[9]

Recommendations for future apiculture business concept in Indonesia:

- focus on education - Indonesia needs to adopt businesses that focus on beekeeping and bee product management to increase supply such as training and capacity building;
- IoT – the need of IT/ IoT based apiculture businesses as there is almost no such business available in Indonesia (least competitors). IT/ IoT based apiculture businesses are encouraged to consider government, research institution, university, and beekeeping/ bee products businesses as potential consumers and/ or key partners;
- build up alliances – there is the need for cooperation between beekeeping businesses in order to fill each other's shortcomings and cooperation between beekeeping businesses with agriculture businesses and other stakeholders to increase bee forage;
- greater market research – honey product businesses should consider honey consumer behaviour and align its value propositions accordingly. It needs to focus on honey authenticity and value criteria (see D2.3 Results of Market Survey) and consumer motivation in consuming honey;
- edu-tourism and ecological based beekeeping – such business models are considered as a promising revenue stream especially for youth since the youth interest in beekeeping is increased as they concern about ecological value.

[9] D2.3 Market Survey Report

3.3.3. EU

The SAMS Business Models for EU – from education to monitoring tool, software, hardware and supporting logistics/ supply such as 3D case, Data Warehouse, power supply, etc. – are based on the findings of the project and a brainstorming session of all project partners. They are all freely available for further elaboration and market launch. Since the Business Models are in line with the EU interest in supporting and strenghtening the beekeeping sector, it is highly recommended to further elaborate them.

4. Forecast

Funding, licencing and certification as well as adaption and upscaling potential are essential for a successfully established business. Two reports will focus on this – *D2.5 Evaluation of Business Licences in Place or in Formation* and *D6.2 Results of Cross-Regional Transfer Studies*.

4.1 Funding and Licensing Support

The most promising SAMS Business Models are supported in funding, licencing and certification. Therefore, appropriate sources were identified in cooperation with the business partnership network (WP6). All the funding, licencing and certificate sources are available on the SAMS website and SAMSwiki. Suitable options were forwarded to the respective start-ups/ SMEs/ business teams of the identified most promising SAMS Business Models. UNPAD and ICEADDIS support them in developing their business and applying for funds, licences and certificates. The funding, licencing and certificate status will be reported in *D2.5 Evaluation of Business Licences in Place or in Formation* (due December 2020).

The other SAMS Business Models benefit also from the funding, licencing and certification options since all are available on the SAMS website and on SAMSwiki.

4.2 Adaptation and Upscaling Potential Forecast

Adaptation and upscaling of SAMS business and innovation will certainly entail knowledge sharing on the SAMS technology and business models with beekeeping stakeholders in the SAMS target regions and beyond. By giving understanding about SAMS businesses and use of technological advances for the apiculture business, the SAMS project aims to disseminate the SAMS idea and to initiate changes in the behaviour, approaches and apicultural practices towards more efficient, technology driven apiculture. Therefore, SAMS is developing a Cross-Regional Transfer Study (D6.2), which analyses upscaling and adaptation potentials of SAMS to 21 regional settings within Sub-Saharan Africa, Asia and the EU. The study will focus on the international and cross-regional added-value of SAMS Businesses including marketing and trading of bee products and beekeeping potentials in the target regions. Topics of mutual learning and understanding as well as specific issues on product certification/ licensing, impacts of labels such as “Fairtrade” and accessibility rules for the EU market, will be considered. Additionally, the transfer study will examine the transfer potential of the eleven most promising SAMS Business Models, developed within the project target countries, to countries and regions in Africa, Asia and the EU.

As indicated in D6.3 Transfer Study on Data Utilization, the main users of SAMS are small-hold beekeepers, the scientific and economic society. Therefore, the Cross-Regional Transfer Study will examine how these stakeholders could benefit from SAMS business transfer. In addition, the study will examine the use of SAMS for politicians and other potential user community groups. Moreover, the study research will consider SAMS networks and partners from the international partnership on SAMS business development.

4.2.1. Transfer countries of the study

African and Asian countries which have high potential in the field of apiculture but where the apiculture sector is yet undeveloped and in which SAMS businesses could be particularly suitable are selected. Moreover, potentials for transfer and business cooperation with the EU are being examined.

Sub-Saharan African countries that will be examined in the study are: Zimbabwe, Madagascar, Zambia, Rwanda, Ghana, Nigeria, Tanzania, Uganda, Kenya and South Africa.

In total, the study will examine six ASEAN countries (Laos, Myanmar, Malaysia, Thailand, Vietnam and Philippines) and probably four south Asian countries (Nepal, India, Sri Lanka and Bangladesh).

Regarding EU, the study will examine general conditions of trade and marketing in the European market and identify possibilities of trade to Asian and African markets.

4.2.2. Connection Business Case with the Transfer Study

As mentioned above, the Cross-Regional Transfer Study will examine the transfer potential of the eleven most promising SAMS Business Models which were developed in Indonesia, Ethiopia and the EU within the SAMS project. Therefore, critical success factors for the implementation of each SAMS Business Model will be identified and related to regional conditions (environmental circumstances, land use, social and cultural value of apiculture/ api-products, apiculture business and trade, level of honey consumption) in the selected transfer countries.

The Cross-Regional Transfer Study will be available by December 2020 on the SAMS website but also on the SAMS wiki.

Annexes

Annex I Template for Business Development set-up by SAMS

Please fill out the table in addition to the Business Model Canvas to provide us further information about your business idea. For further market information see also the SAMS report D2.3 Results of Market Survey.

The questions in big letters are for guidance only. Please send the completed form **until May 31, 2020 to** Dwi Purnomo (dwi.purnomo@unpad.ac.id) and Marlis Nawawi (marlis230491@gmail.com) for Indonesia/ Yosef Alemayehu (yosef.alemayehu@iceaddis.com) and Markos Lemma (markos.lemma@iceaddis.com) for Ethiopia/ Magdalena Sperl (magdalena.sperl@giz.de) for EU.

We securely store your data until the end of the SAMS project by December 2020 and respect your trust and protect your privacy, and therefore will never sell or share this data with any third parties. After December 2020 the data will be deleted.

START-UP/ SME/ TEAM NAME:

BUSINESS MODEL NAME:

URL LINK TO START-UP/ SME/ TEAM:

CONTACT PERSON (one start-up/ SME/ team member):

<table>
<tr><td colspan="2">1. PLEASE DESCRIBE A SCENARIO BY WHOM, FOR HOW MUCH, WHERE AND FOR WHAT PURPOSE THE PRODUCT OR SERVICE WILL BE USED/ BOUGHT etc. (e.g. The product/ service xy (name) will be bought by xy (target group) for xy (Euro/ IDR/ Birr) at xy (supermarket, online) in order to xy (purpose)):</td></tr>
<tr><td rowspan="3">BUSINESS CONCEPT</td><td>2. PLEASE TICK THE STATUS OF YOUR BUSINESS IDEA:
☐ IDEATION ☐ FIRST IMPLEMENTATION ☐ ESTABLISHED BUSINESS ☐ SCALE UP</td></tr>
<tr><td>3. PLEASE NAME THE IDENTIFIED PROBLEM YOUR BUSINESS IDEA TACKLES:</td></tr>
<tr><td>4. PLEASE TICK IN WHICH WAY THE BUSINESS IDEA IS CONNECTED TO THE APICULTURE SECTOR:
☐ HONEY BEE PRODUCT (e.g. honey, beeswax, cosmetic, food)</td></tr>
</table>

	☐ APIARY RELATED TECHNOLOGY (e.g. monitoring system, hardware, software, data analysing) ☐ BEEKEEPING EDUCATION (e.g. education platform, wiki, trainings) ☐ BEEKEEPING SUPPLY/ EQUIPMENT (e.g. beehives, clothes, smoker) ☐ BEEKEEPING SERVICE (e.g. pollination service, tourism) ☐ OTHER:
	5. PLEASE EXPLAIN WHO ARE YOUR TARGET CUSTOMERS AND NAME THE NUMBER OF POSSIBLE BENEFICIARIES: ☐ not yet considered
	6. PLEASE NAME THE CUSTOMER NEED: ☐ not yet considered
	7. PLEASE NAME THE TYPE OF RESEARCH THAT WAS DONE TO LEARN ABOUT THE CUSTOMER AND THE MARKET (e.g. literature study, surveys, interviews, statistics)**:** ☐ not yet considered
	8. PLEASE NAME COMPETITORS (SIMILAR BUSINESSES THAT ARE ALREADY EXISTING ON THE MARKET) AND POINT OUT THE ADVANTAGES OF YOUR PRODUCT/ SERVICE: ☐ not yet considered
	9. PLEASE NAME THE PRICE OF YOUR PRODUCT/ SERVICE: **PLEASE NAME HOW MUCH THE CUSTOMERS ARE MAX. WILLING TO PAY:** ☐ not yet considered
	10. PLEASE NAME THE REVENUE MODEL OF THE BUSINESS IDEA: ☐ not yet considered
	11. PLEASE NAME HOW THE BUSINESS IDEA WILL BE ESTABLISHED FINANCIALLY (e.g. national/ international financial supporting schemes, angel investor, bootstrapping, government funding):

	☐ not yet considered
	12. PLEASE TICK HOW LONG DOES IT TAKE UNTIL THE PRODUCT IS SALEABLE: ☐ 0-4 MONTHS ☐ 5-8 MONTHS ☐ 9-12 MONTHS ☐ 1-2 YEARS ☐ 2-3 YEARS ☐ not yet considered
IMPACT	**13. PLEASE DESCRIBE THE IMPACT OF YOUR BUSINESS IDEA ON THE APICULTURE SECTOR:** ☐ not yet considered
	14. PLEASE TICK THE BUSINESS IDEA'S RELEVANCE TO SAMS (you can choose more than one option): ☐ CREATING JOBS ☐ EMPOWERING WOMEN ☐ EMPOWERING YOUTH ☐ DISSEMINATION OF MODERN BEEHIVES ☐ INCREASING PRODUCTIVITY RATE OF BEE-COLONIES ☐ REDUCTION OF APICULTURE MANAGEMENT EFFORTS (e.g. transportation costs) ☐ DATA TRANSFERABILITY IN OTHER LOW- AND MIDDLE-INCOME COUNTRIES ☐ KNOWLEDGE TRANSFER IN SUB-SAHARAN AFRICAN AND ASEAN COUNTRIES ☐ TRIGGERING INVESTMENTS BY EU STAKEHOLDERS ☐ NO RELEVANCE ☐ OTHER:
	15. PLEASE EXPLAIN HOW YOUR BUSINESS IDEA WILL BE SCALED-UP AND/ OR REPLICATED IN OTHER REGIONS/ COUNTRIES (e.g. where, when, how big): ☐ not yet considered

	16. PLEASE PROVIDE NUMBERS ON HOW MANY TEAM MEMBERS ARE WORKING ON THE BUSINESS IDEA IN TOTAL: FULL TIME: PART TIME: **ARE YOUTH (18-35): ARE WOMEN:**
TEAM	**17. PLEASE EXPLAIN WHICH IMPORTANT SKILLS YOUR TEAM MEMBERS COVER:** ☐ FINANCIAL ☐ MANAGERIAL ☐ TECHNICAL ☐ MARKETING ☐ SOCIAL ☐OTHERS: ☐ not yet considered **AND TICK WHAT THE TEAM WILL DO TO CLOSE THE GAP (SKILL):** ☐ TRAININGS ☐ HIRE PROFESSIONAL STAFF ☐OTHERS: ☐ not yet considered
START-UP/ SME	**18. PLEASE NAME THE MONTH AND YEAR YOUR START-UP/ SME WAS ESTABLISHED:** ☐ not applicable
	19. PLEASE PROVIDE THE NUMBER OF TOTAL EMPLOYEES OF YOUR START-UP/ SME: ☐ not applicable
	20. PLEASE NAME OTHER PRODUCTS YOU HAVE/ YOUR START-UP/ SME HAS ON THE MARKET: ☐ not applicable
	21. PLEASE NAME HOW THE START-UP/ SME IS CURRENTLY FINANCED, e.g. national/ international supporting schemes: ☐ not applicable
	22. PLEASE NAME BUSINESS COMPETITIONS YOU TOOK PART: ☐ not applicable

	23. PLEASE EXPLAIN HOW YOU EXPECT YOUR START-UP/ SME TO EXPAND AND GROW OVER THE NEXT 5 YEARS: ☐ not yet considered
	24. PLEASE NAME HOW THE START-UP/ SME WILL BE FINANCED IN THE LONG-TERM: ☐ not yet considered

Annex II Self-Assessment for Business Development

Start-up/ SME/ team name and business idea name :	
URL link to start-up/ SME :	

This matrix is a self-assessment tool to help you identify the stage of your current business and social impact, and where you want to bring your business forward. There is no right or wrong answers.

1. Each column represents the indicator of your social impact and business model.
2. Each row represents the stage of the indicator (ideation; vaidation; established; scale up) which identify the state of your social impact and business model.
3. Identify which stage the business is at right now, and mark the cell with yellow color. It is fine if not all indicators are at the same level.

STAGE	IMPACT (business model)	PRODUCT (business model)	MARKET PRESENCE (business model)	FINANCIAL HEALTH (start-up/ SME)	FOUNDERS AND TEAM (start-up/ SME)
Ideation	Problem spotted; First idea of solution	Idea	No customer and user	No revenues	Founder(s); No formal structure
Validation	Social or environmental mission idea well developed, tied to the business model	First tested prototype	First customers and users	First revenue, not covering all the cost; Demonstrated survivability	Solid small team with basic skills for running business; Basic organizational structure
Established	Impact tied to the business model and measured	Saleable product	Stable number of customers and reaching out to attract more customers	Revenue covering the costs, not yet generating positive cash-flow	Solid small team with professional skills on finance, operations and marketing
Scale Up	Potential for a system-level change	Scaleable product and good brand	Competitiveness; readiness for market growth	Profitable and generating cash	Bigger team with professional skills on finance, operations and marketing; Core management team works full-time; Well-defined organizational structure

Annex III Business Model Canvas Ethiopia

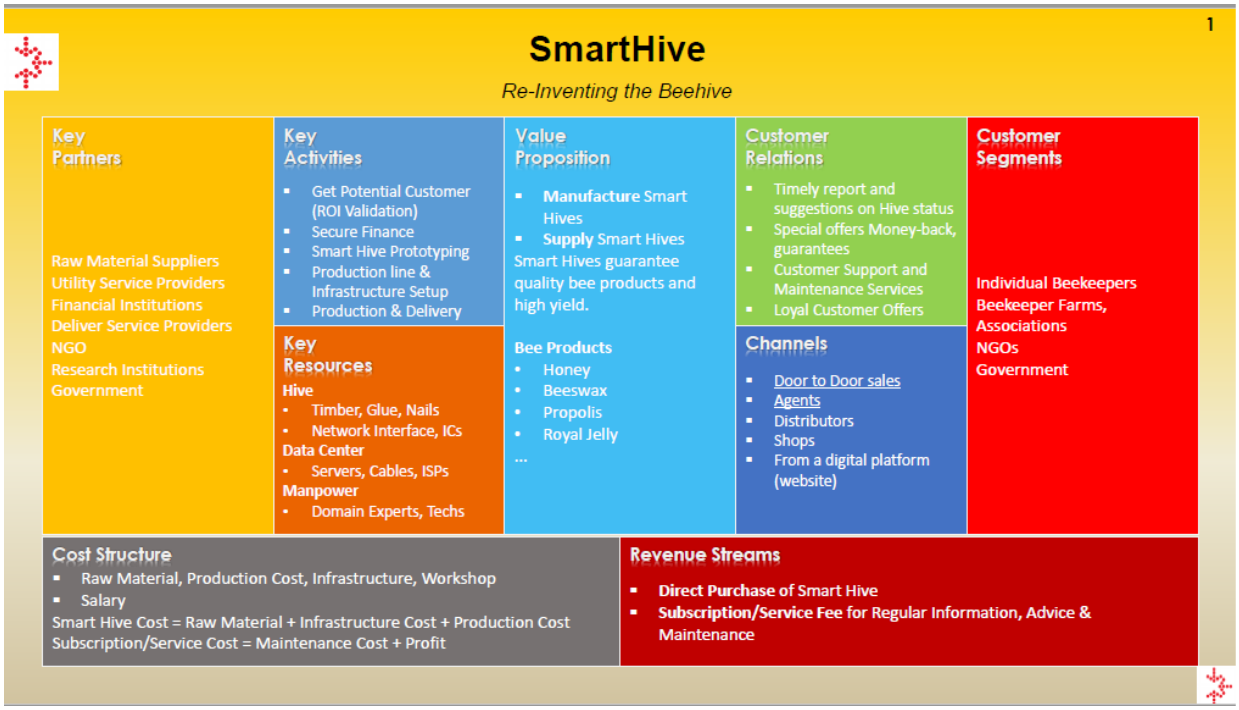


Figure 5 BMC of Smart Hive

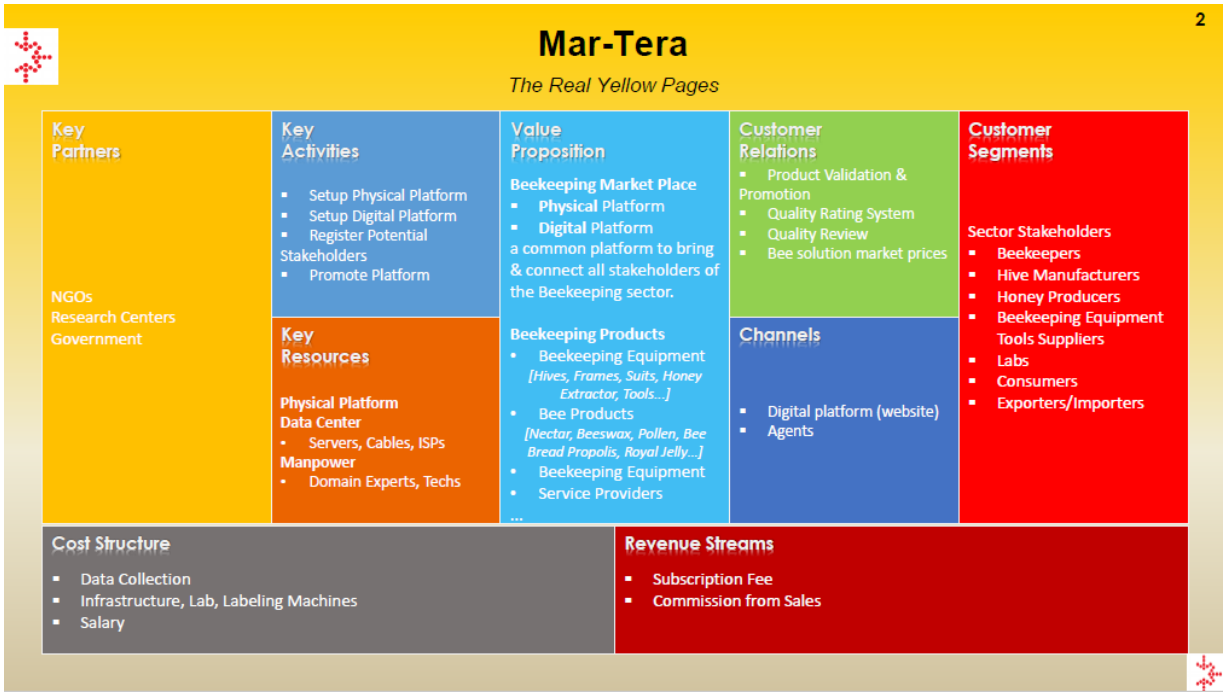


Figure 6 BMC of Mar-Tera

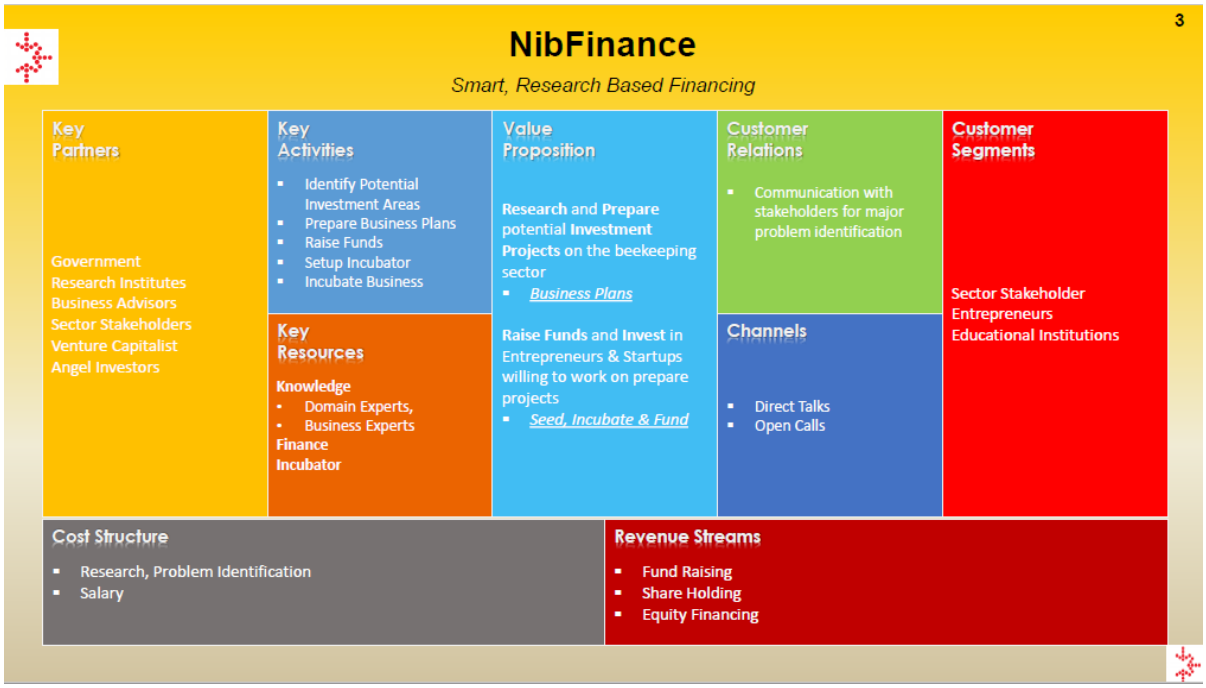


Figure 7 BMC of NibFinance

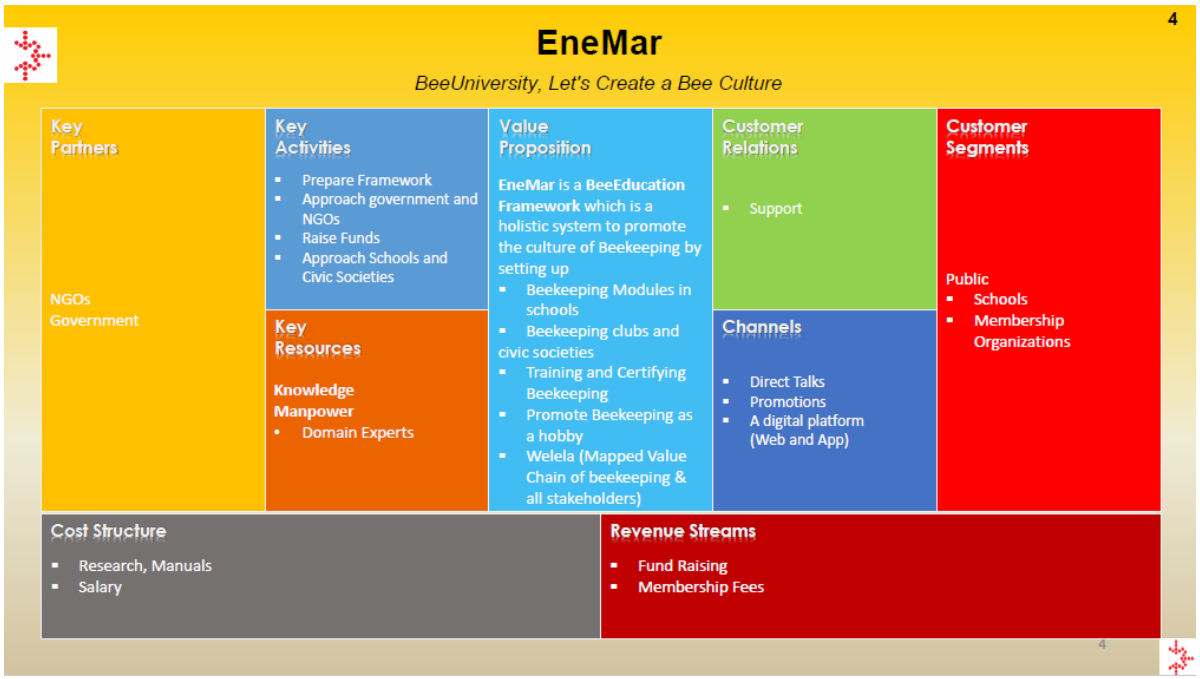


Figure 8 BMC of EneMar

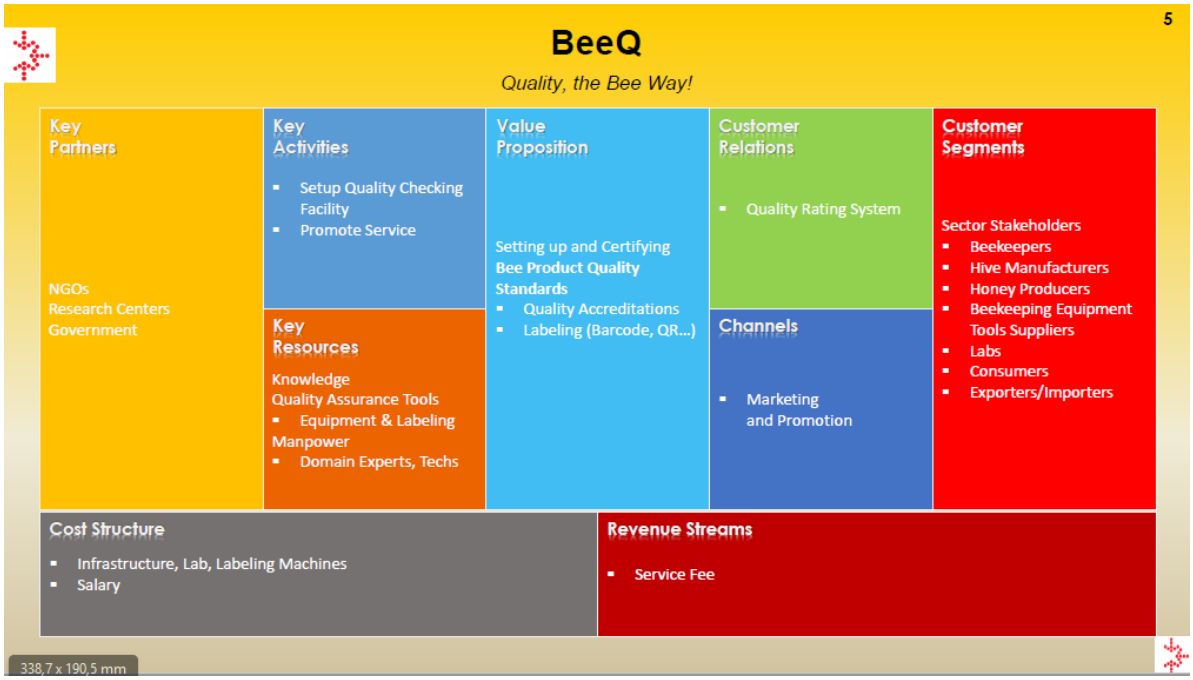


Figure 9 BMC of BeeQ

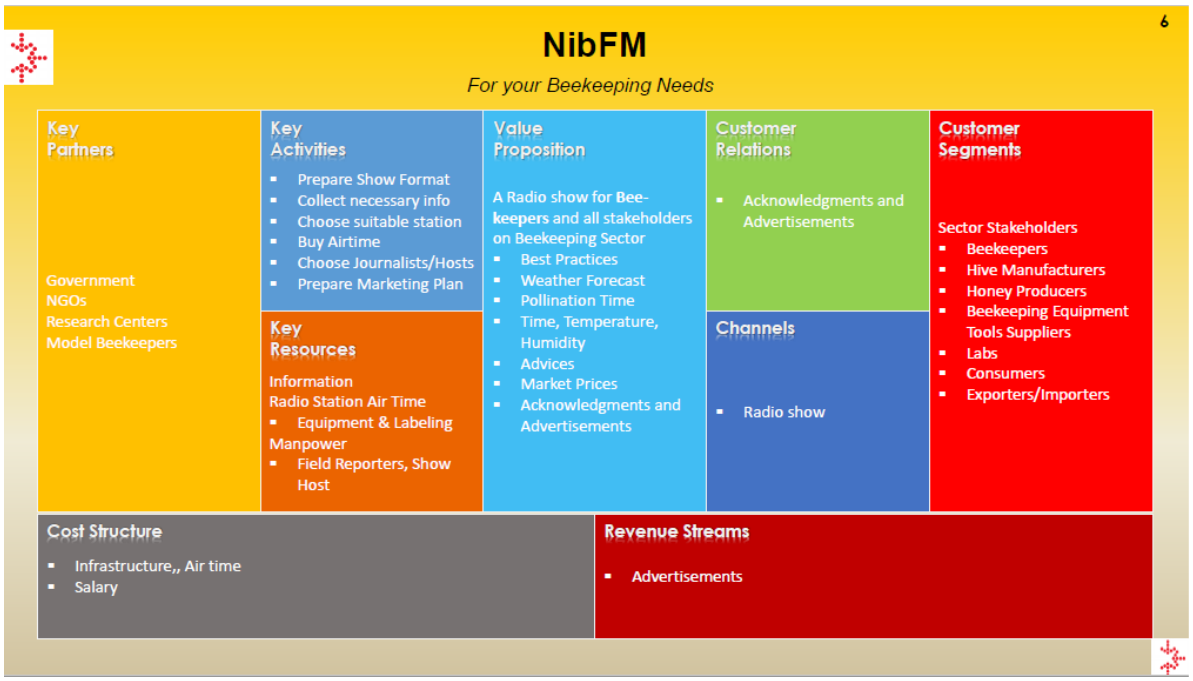


Figure 10 BMC of NibFM

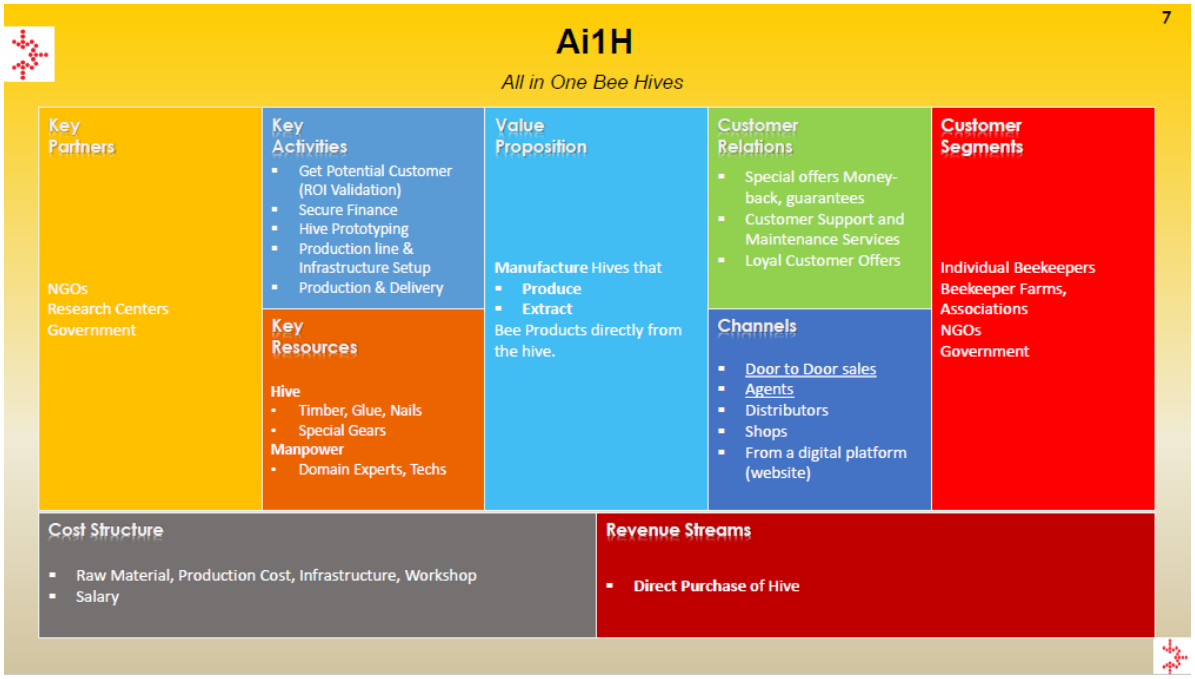


Figure 11 BMC of Ai1H

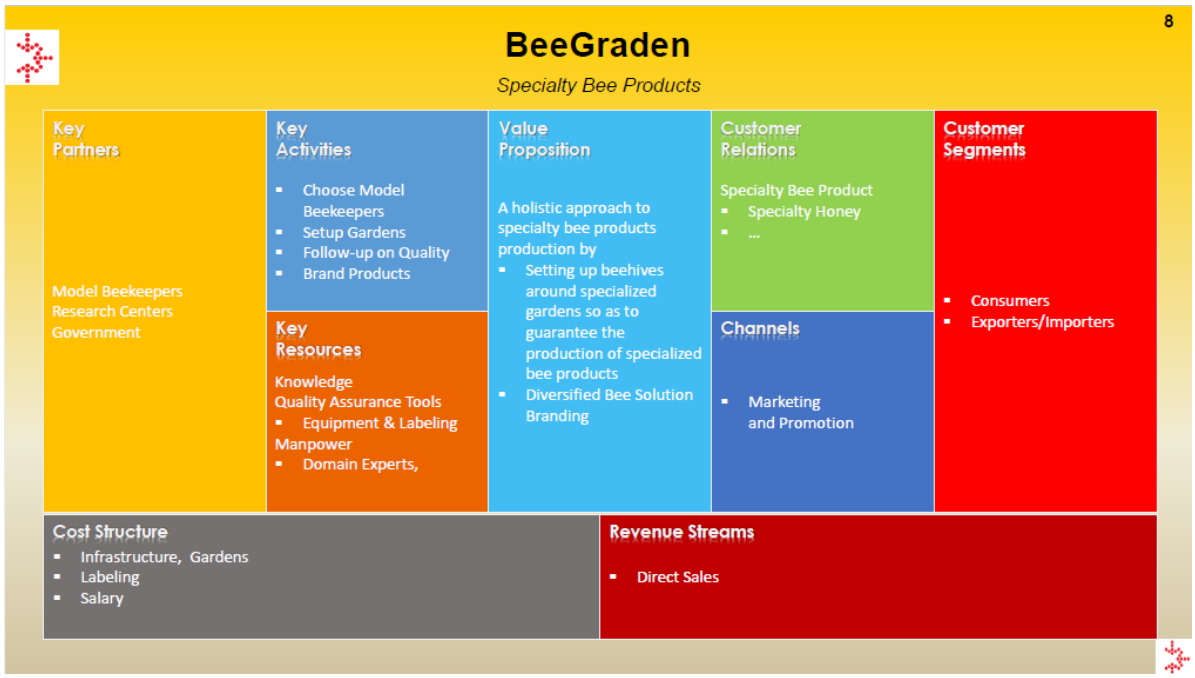


Figure 12 BMC of BeeGarden

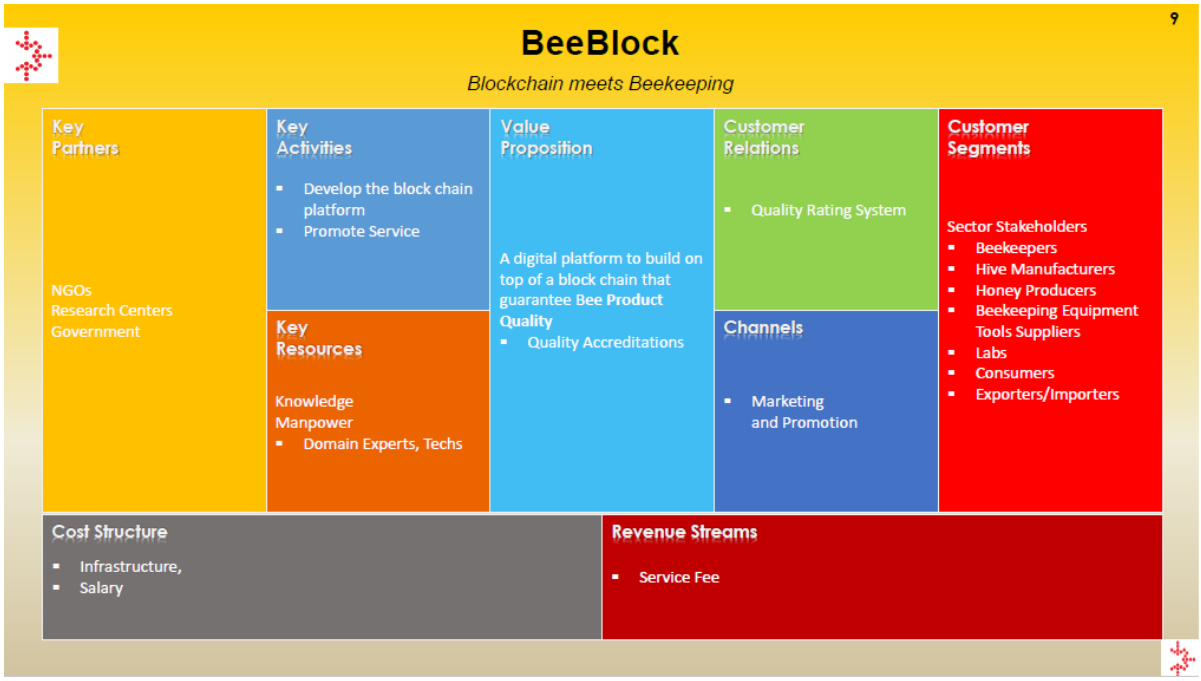


Figure 13 BMC of BeeBlock

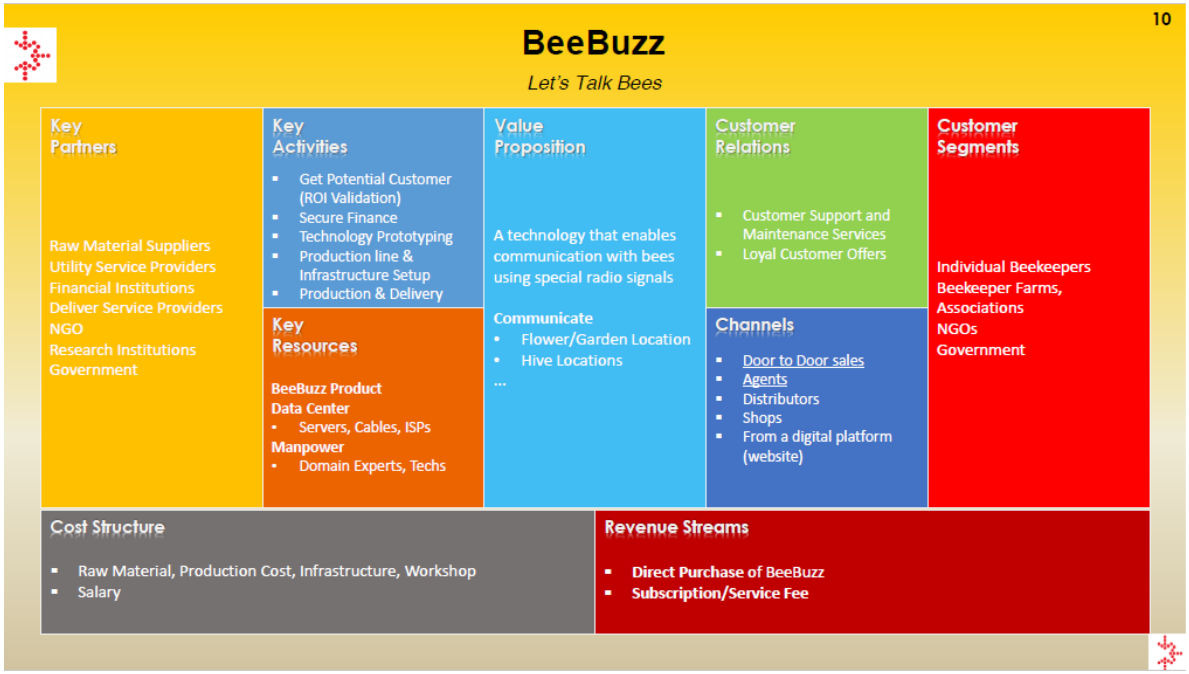


Figure 14 BMC of BeeBuzz

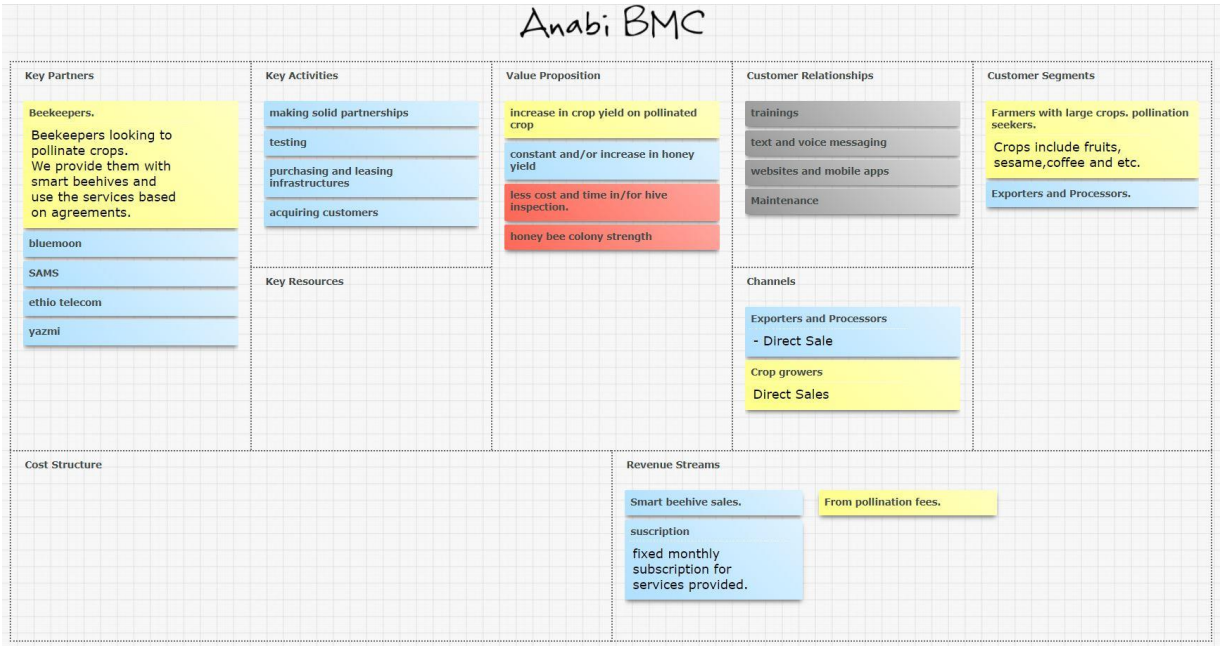


Figure 15 *BMC of Anabi*

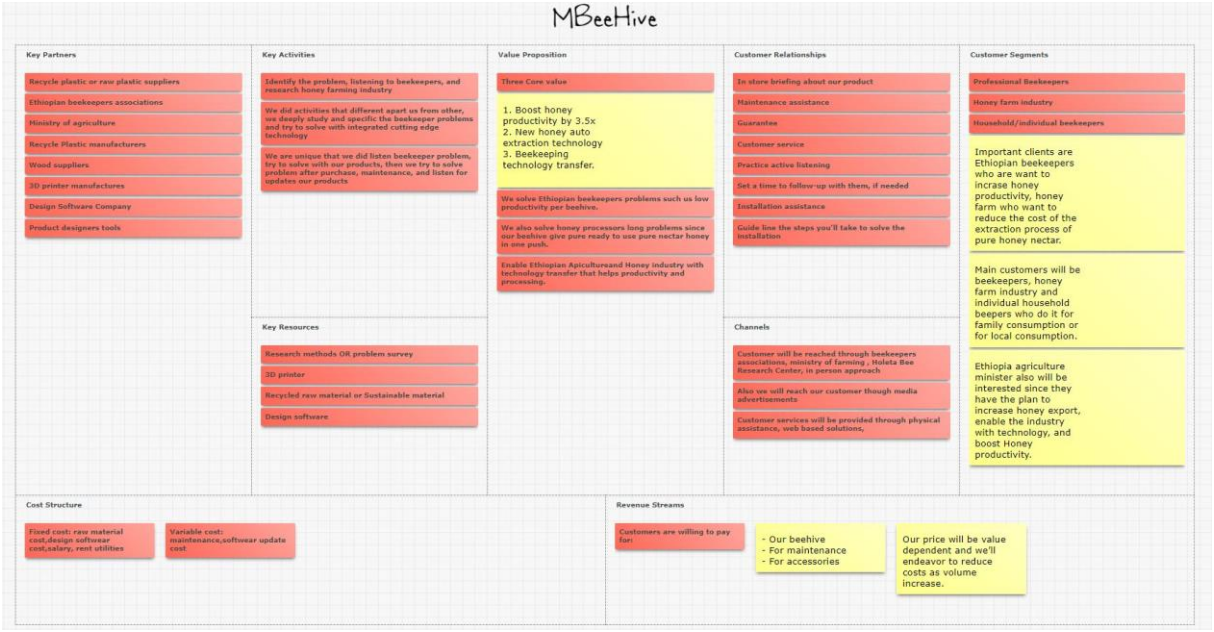


Figure 16 *BMC of MbeeHive*

Business Model Canvas

Designed for: Mar: Online apiculture training paltform | *Designed by:* Awesome Africa | *Date:* 6/26/2020 | *Version:* v 1.0

Key Partners

GIZ: arranging Exposure, Sponsership and fundings

World Permaculture: give us access to experts and permaculture trainings, and related support.

Agri-pro: acces to permaculture, workshops and the experts they have as well as their partners.

IsraelAgri(http://www.israelagri.com/), Cultivid, Kibutz

MASHAV – Israel's Agency for International Development Cooperation, Ministry of Foreign Affairs

- give us access to experts and trainings.
- knowledge sharing on techniques and methods of increase quality and quantity productions.
- equipments and funding supports.

Smart Villages: euipments and networking support

ATA: govermental supports agri-tech comapanies

CTO: Recognitios, Fundings, Sponsuerships, Networks, Exposures, and international relationships

IceAddis: important informations, Networking, recommendations...

Key Activities

What Key Activities do our Value Propositions require? Our Distribution Channels? Customer Relationships ? Revenue streams ?

- Relationship cultivation with partners
- Establishing our Dream Team
- Developing an operational MVP of our platform
- Customer Development
- Product/Customer Testing
- Publishing production level platform
- Marketing and Advertizing: preparing the appropriate media
- Continual customer feed back collection, maintaining and upgrading the platform
- Scalling the our enterprise/services through affiliation

Key Resources

What Key Resources do our Value Propositions require? Our Distribution Channels? Customer Relationships Revenue Streams?

- Internet connection, smart phones from the our customers side and
- software development tools like laptop computers, internet connections,
- skilled human resource: Permacultre Experts, Sofware engineer, Marketing Professional, Apiculture and Agriculture prifessionals, Accountant,
- office rent, initial capital
- bank account or electronic money accounts to recieve payments from our customers.

TYPES OF RESOURCES: Physical, Intellectual (brand patents, copyrights, data), Human, Financial

Value Propositions

Our customers get the following befites when working with us:

- Cheap and convenient access to expert skills.
- Conveniently learn established principles of organic production in few clicks
- Skills to increase their harvesting yield and with no extra cost
- Seeds (GMS/GES) to cultivate.
- Become involved in a encouraging environment
- Supply chain service at their convinience.
- Awarding and seed funding for best producers (with patrners support)
- Global Recognition and World Prmaculture Certification from our partners.
- Networking and connections with our global partners.
- Sponered workshps (local/international)
- Loan arrangements from development bank of Ethiopia
- Help them create jobs for themselves
- Improve their economy by being productive

CHARACTERISTICS: Newness, Performance, Customization, "Getting the Job Done", Design, Brand/Status, Price, Cost Reduction, Risk Reduction, Accessibility, Convenience/Usability

Customer Relationships

- Useful and practical trainings: we achieve that by including finest contents in colaboration with partners.
- Expert guides that can help them in their situation. We achive that automating the expert suggestions and guides in all possible scenarios.
- Certifications: we achive that by conducting well prepared evaluations and cerifiying the well performing candidates.
- Fair competetion, Award and recognition
- Network with relevant entities (national and international)

Channels

Our customers have the following routines:

- using social media
- going to ditrict administration for different affairs
- using govt multi-media

The chanels we use to market are:

- Digital channels: social medias, University meadias, government multimedia
- Physical channels: Marketing and sells in universities, in District and subcity adminisration in Addis Ababa and other cities like Awasa, Mkele, Butajira, Werabe, Halaba, Hosana, Wolkite, Dila, Sodo, Durame, Konso, Arbaminch

Customer Segments

For whom are we creating value? Who are our most important customers? Is our customer base a Mass Market, Niche Market, Segmented, Diversified, Multi-sided Platform

Our customer base is Segmented market

Customer segments that we are creating value to are:

- Agriculture college students, teachers, gradguates, staffs
- Agricultural business support staff in Trade and endustry depatrments of district administration
- Micro organizations working on urbun/rural agriculture/apicultur
- Farmers and bee-keepers
- Others who are litrated and permaculture to create incor

Cost Structure

Key Activities are that are most expensive: Office rent, Marketing in physical places.

OUR BUSINESS MORE: low price value proposition

Our costs are

- Fixed Costs : team s alaries, rents , utilities, service maintenance
- Variable costs: Training video editions, Training content translaion,Transports, Accomodations, Accesories, Certifications, Awards and miscellaneous costs

Revenue Streams

Customers are willing to pay for expertise knowledge and personalised recommendations.

Payment Type:

- Subscription fees: Access to all available lessons: 6 month = 270 ETB | 1 year = 480 ETB

Figure 17 BMC of Awesome Africa

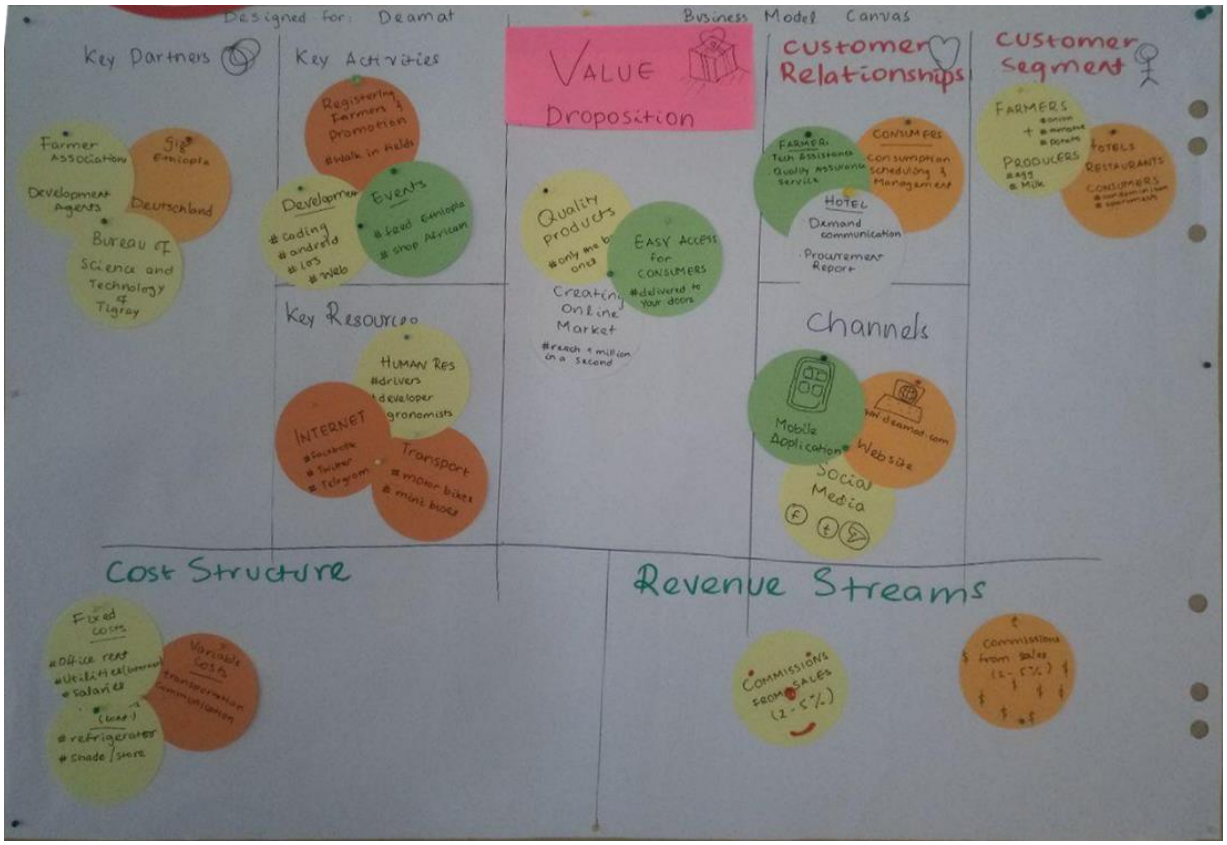


Figure 18 BMC of Daemat

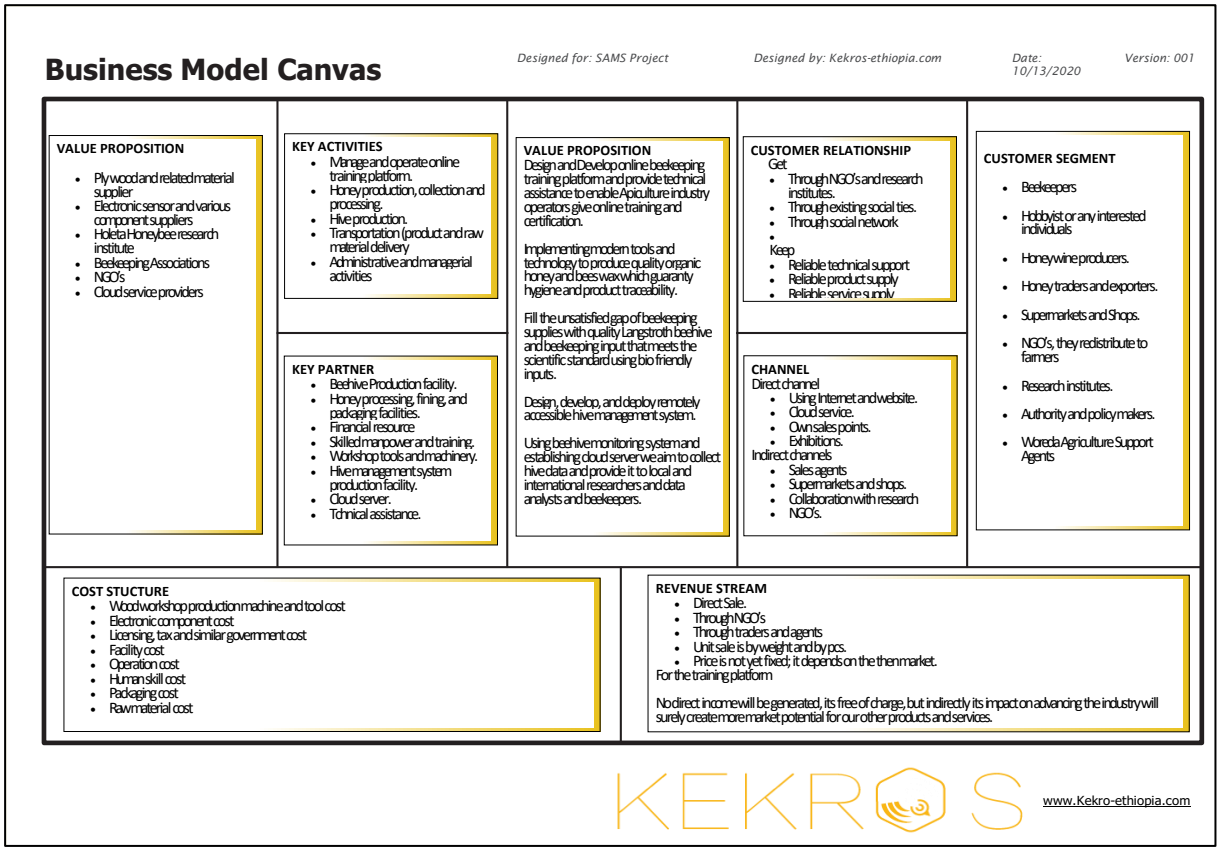


Figure 19 BMC of Kekros Ethiopia

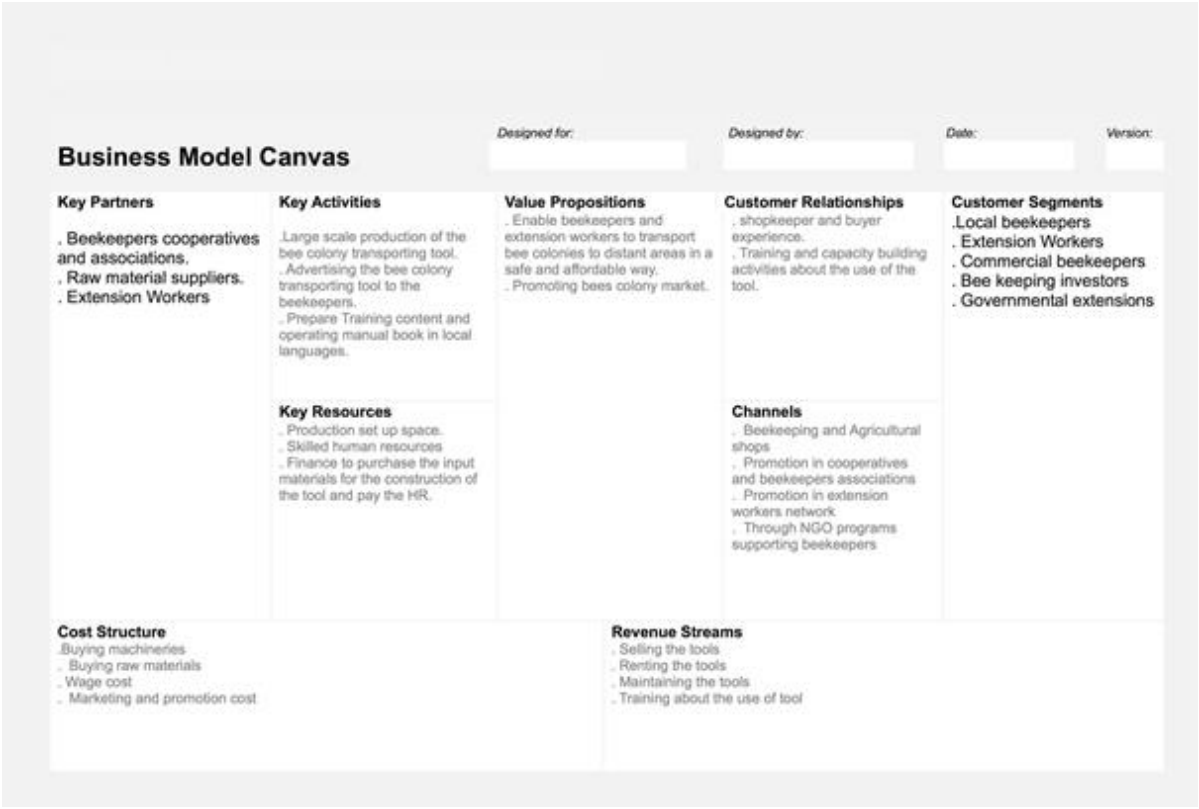
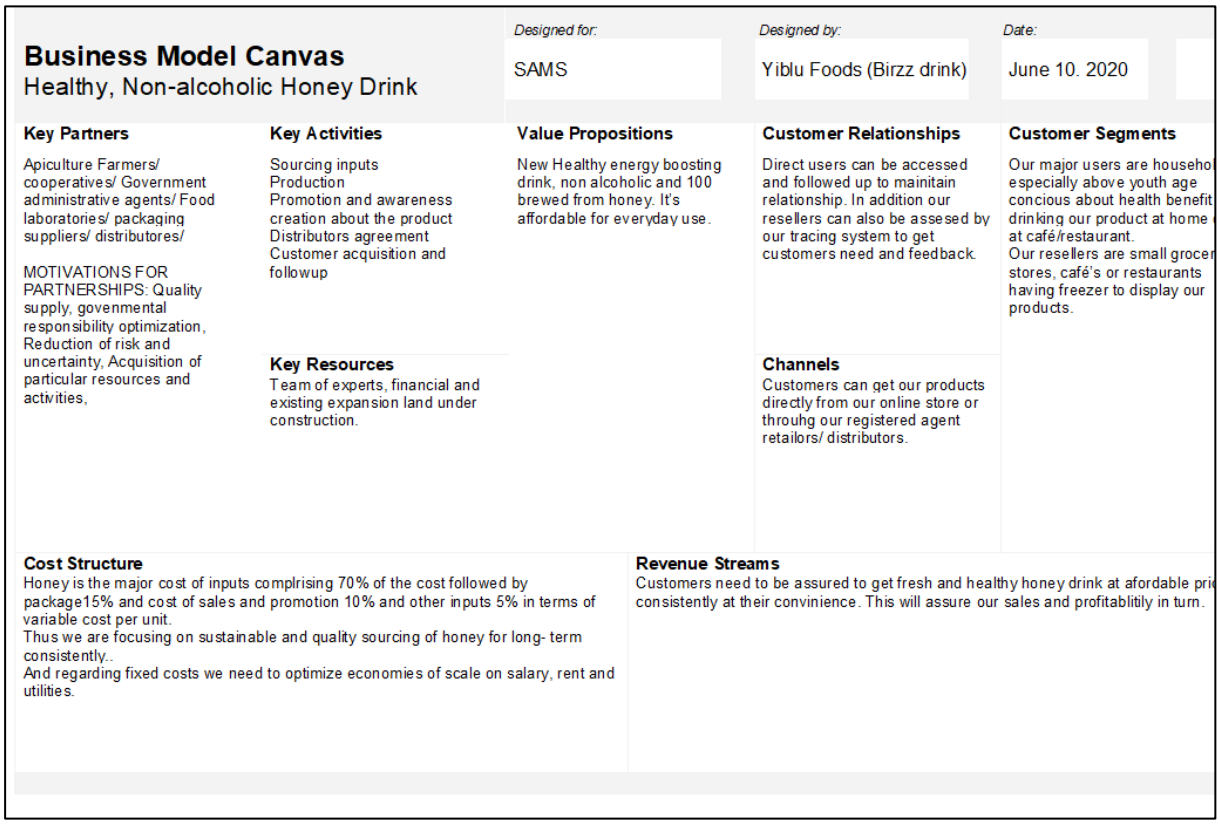


Figure 20 BMC of Bee colony transportation facilitation tool



Business Model Canvas
Healthy, Non-alcoholic Honey Drink

Designed for: SAMS
Designed by: Yiblu Foods (Birzz drink)
Date: June 10. 2020

Key Partners
Apiculture Farmers/ cooperatives/ Government administrative agents/ Food laboratories/ packaging suppliers/ distributores/

MOTIVATIONS FOR PARTNERSHIPS: Quality supply, govenmental responsibility optimization, Reduction of risk and uncertainty, Acquisition of particular resources and activities,

Key Activities
Sourcing inputs
Production
Promotion and awareness creation about the product
Distributors agreement
Customer acquisition and followup

Key Resources
Team of experts, financial and existing expansion land under construction.

Value Propositions
New Healthy energy boosting drink, non alcoholic and 100 brewed from honey. It's affordable for everyday use.

Customer Relationships
Direct users can be accessed and followed up to mainitain relationship. In addition our resellers can also be assesed by our tracing system to get customers need and feedback.

Channels
Customers can get our products directly from our online store or throuhg our registered agent retailors/ distributors.

Customer Segments
Our major users are household especially above youth age concious about health benefit drinking our product at home at café/restaurant.
Our resellers are small grocer stores, café's or restaurants having freezer to display our products.

Cost Structure
Honey is the major cost of inputs complrising 70% of the cost followed by package15% and cost of sales and promotion 10% and other inputs 5% in terms of variable cost per unit.
Thus we are focusing on sustainable and quality sourcing of honey for long- term consistently..
And regarding fixed costs we need to optimize economies of scale on salary, rent and utilities.

Revenue Streams
Customers need to be assured to get fresh and healthy honey drink at afordable pri consistently at their convinience. This will assure our sales and profitablitily in turn.

Figure 21 BMC of Yiblu

Annex IV Business Model Canvas Indonesia

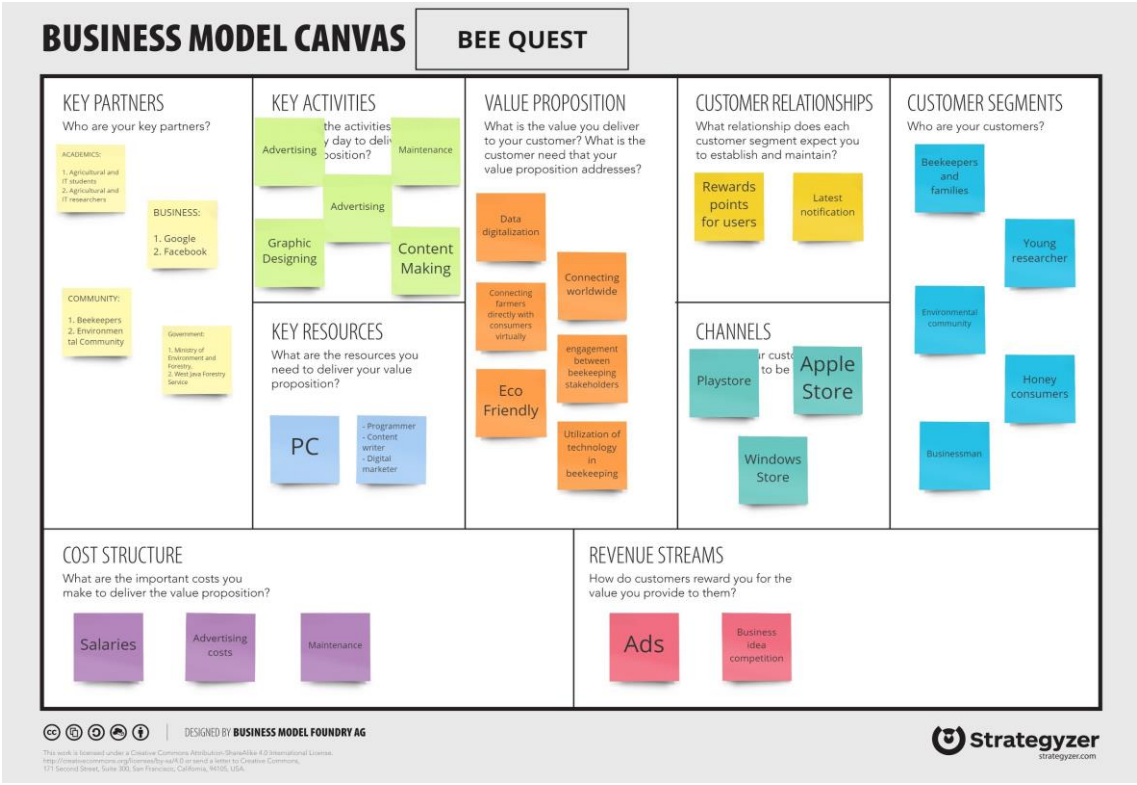


Figure 22 BMC of Bee Quest

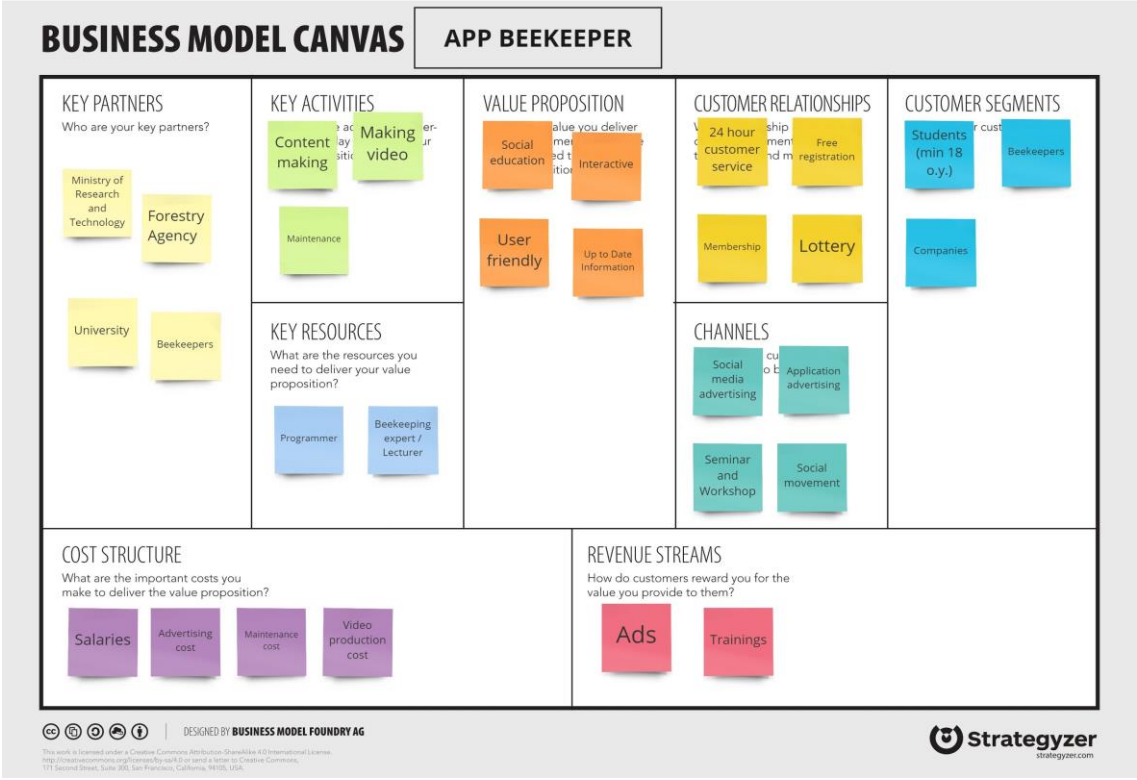


Figure 23 BMC of App Beekeeper

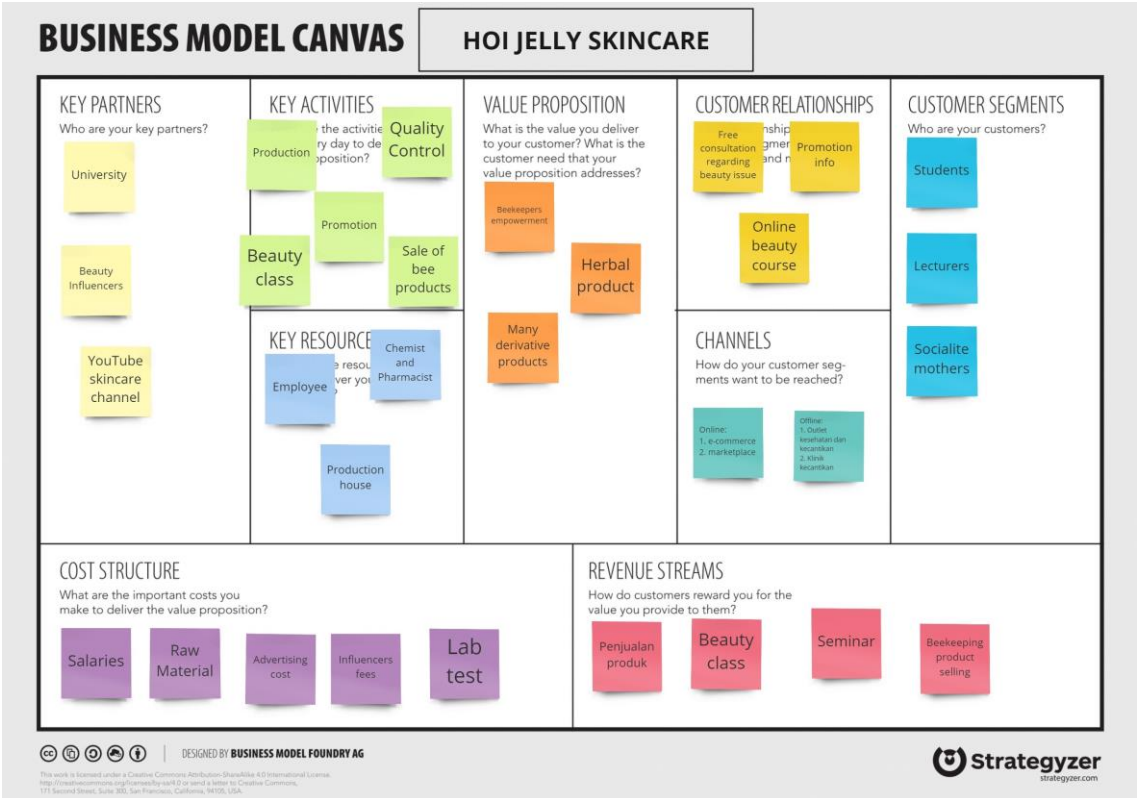


Figure 24 BMC of HOI Jelly Skincare

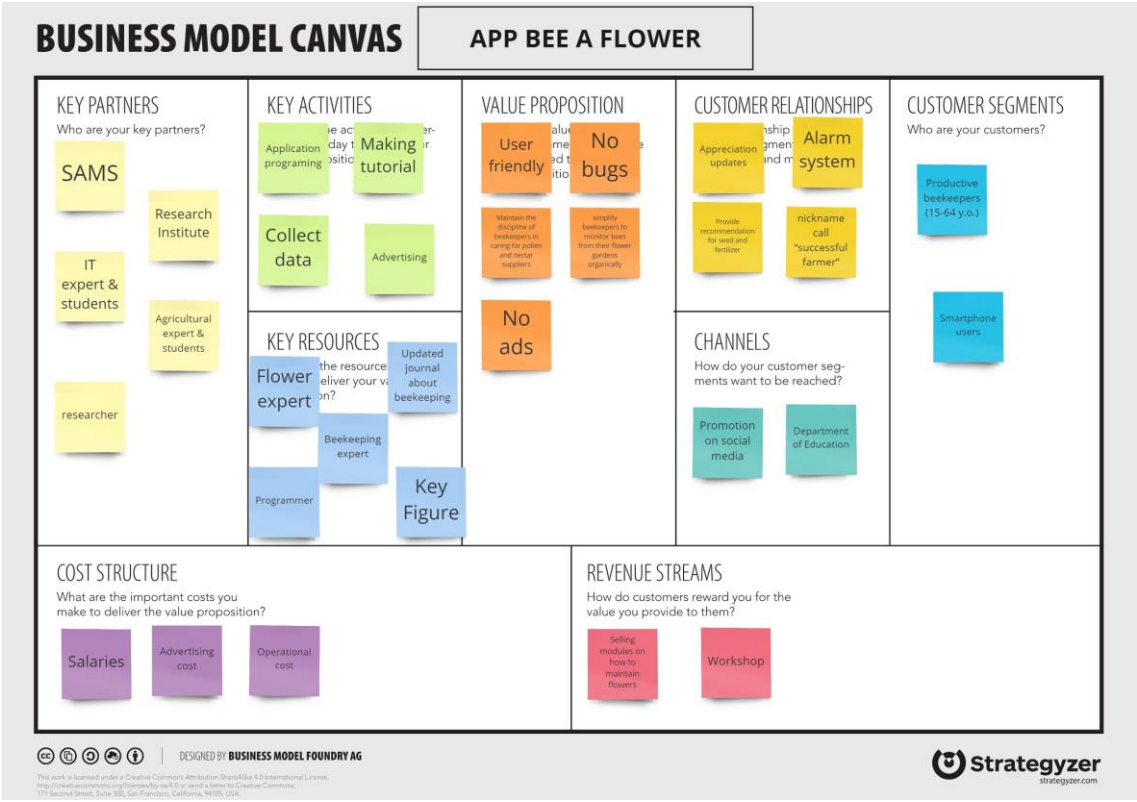


Figure 25 BMC of App Bee a Flower

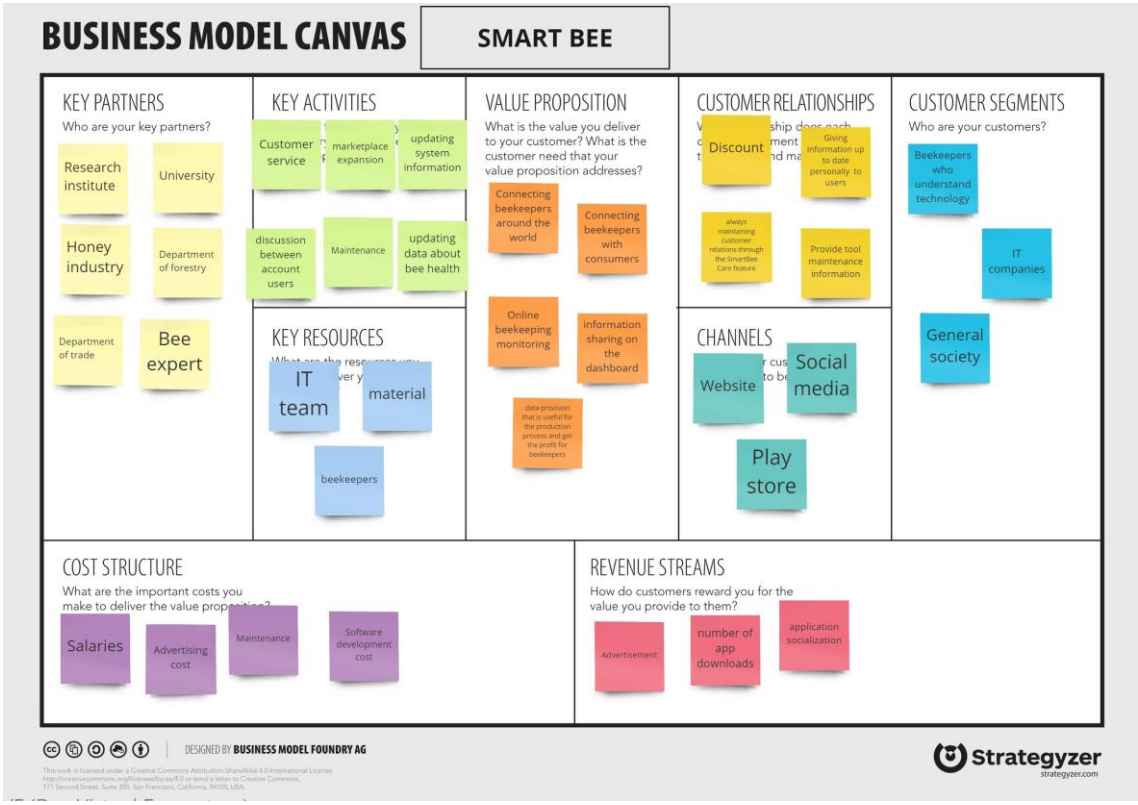


Figure 26 BMC of Smart Bee

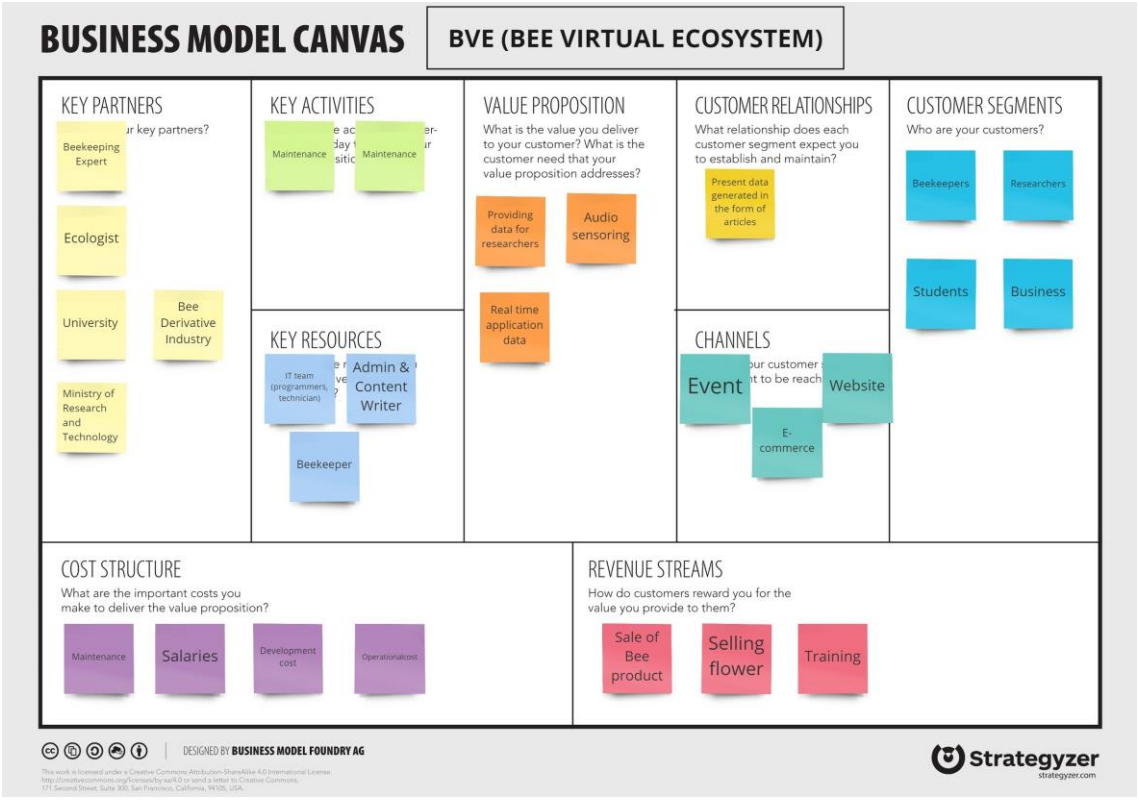


Figure 27 BMC of Bee Virtual Ecosystem

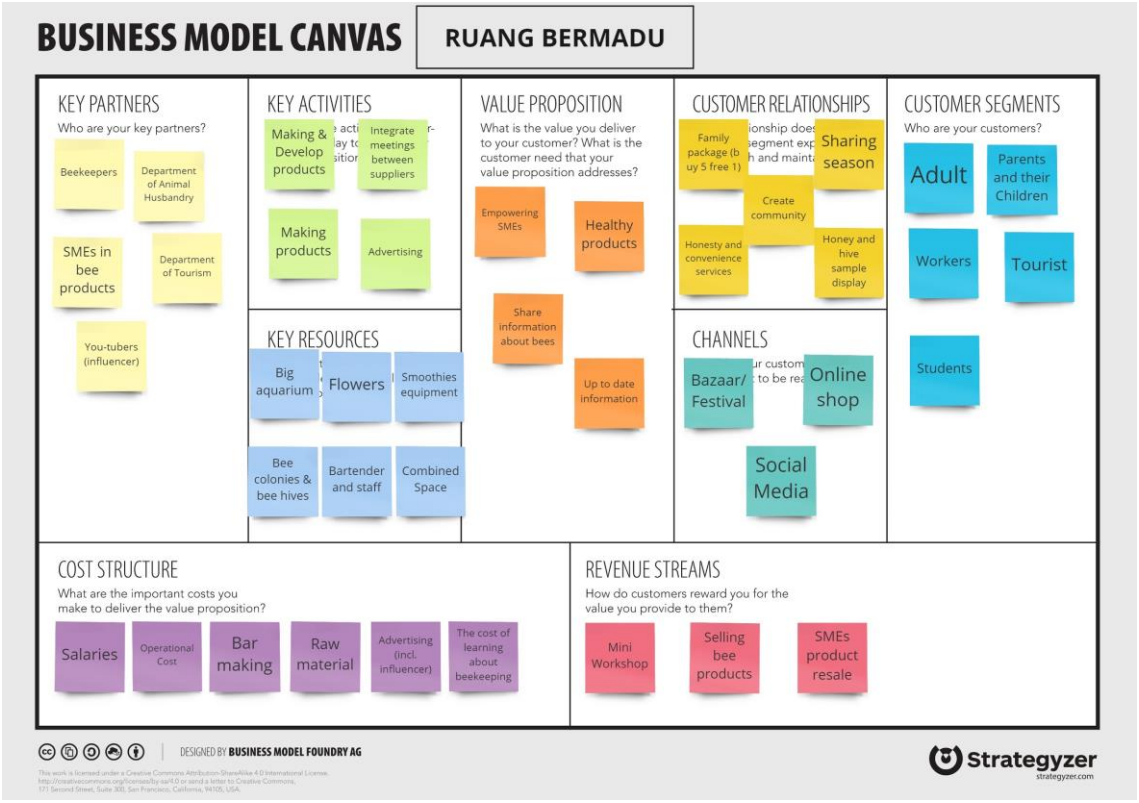


Figure 28 BMC of Ruang Bermadu

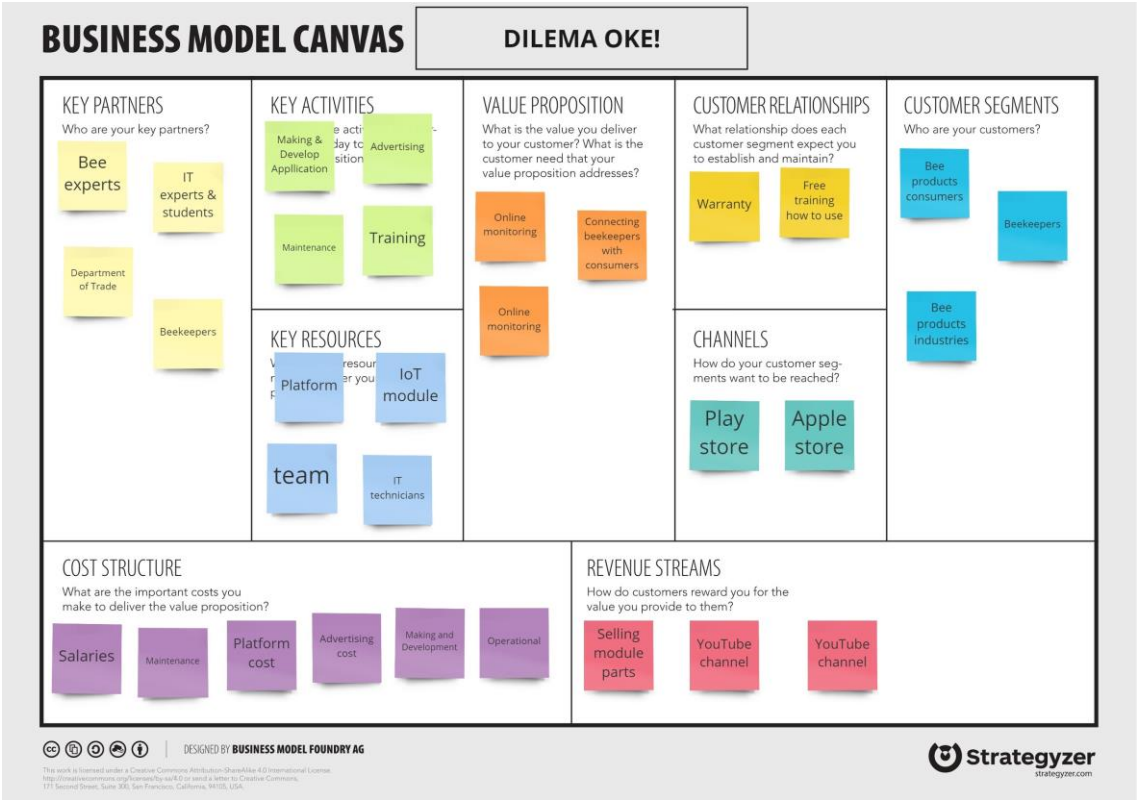


Figure 29 BMC of Dilema OKE!

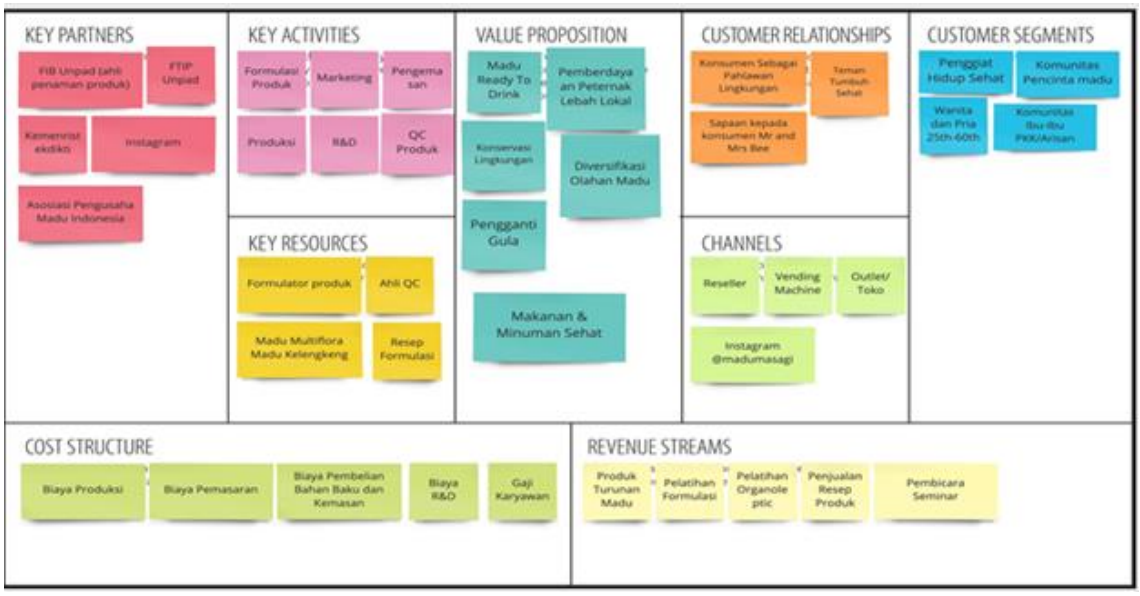


Figure 30 BMC of Masagi

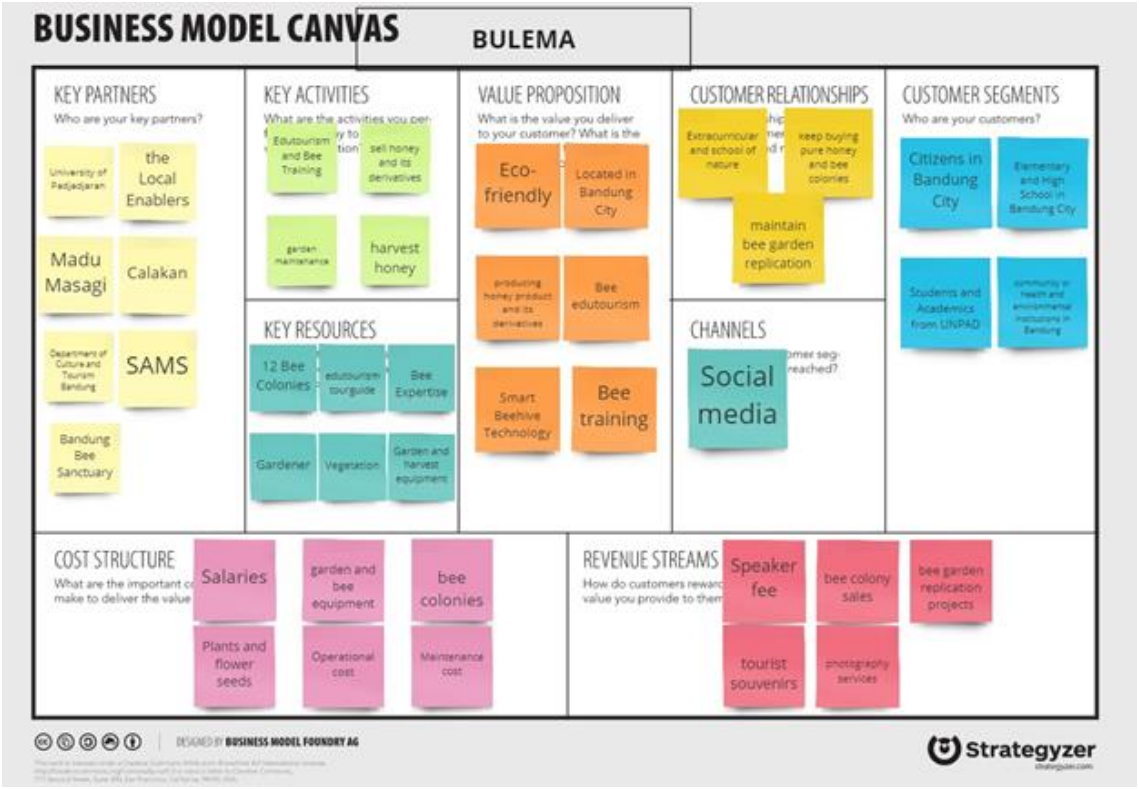


Figure 31 BMC of Bulema

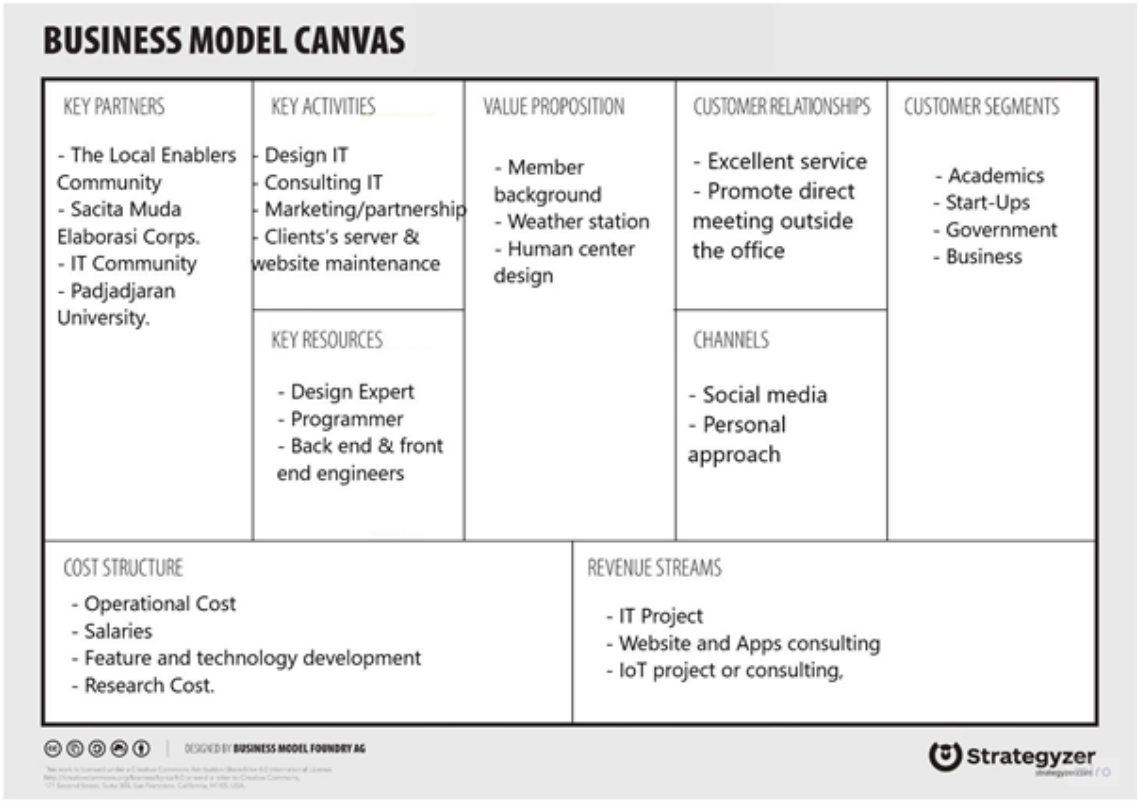


Figure 32 BMC of Calakan

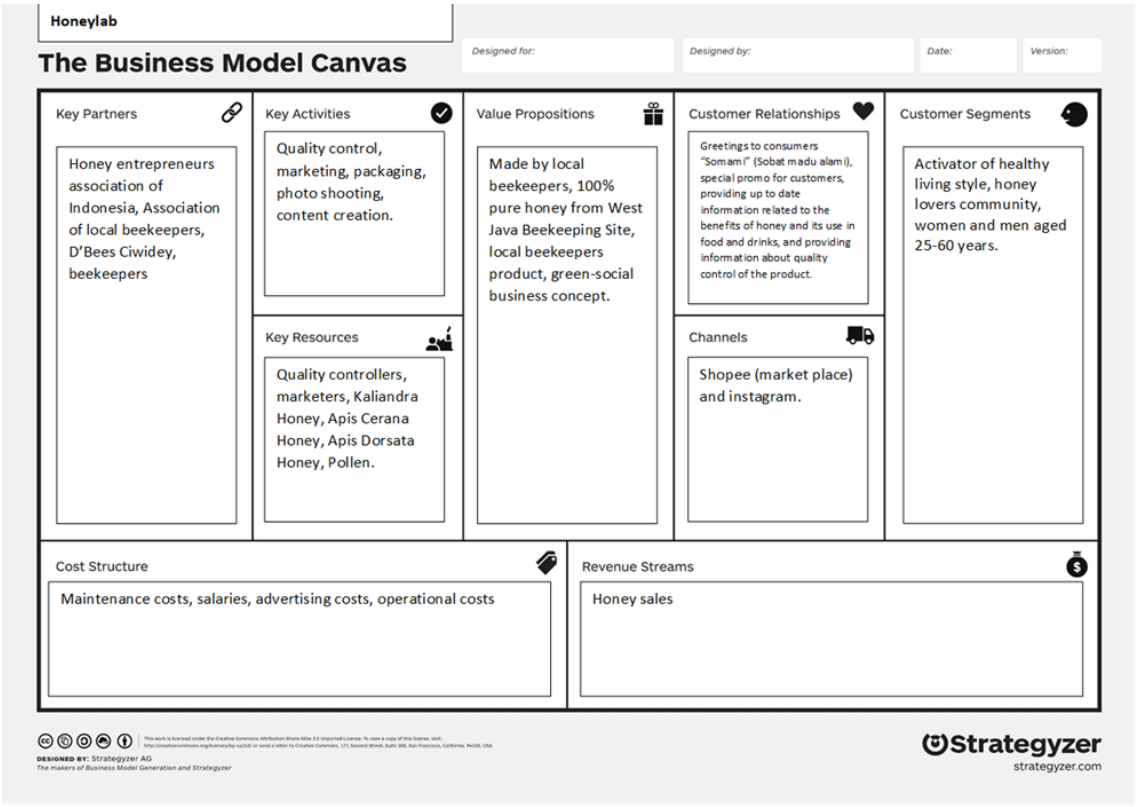


Figure 33 BMC of Honey Lab

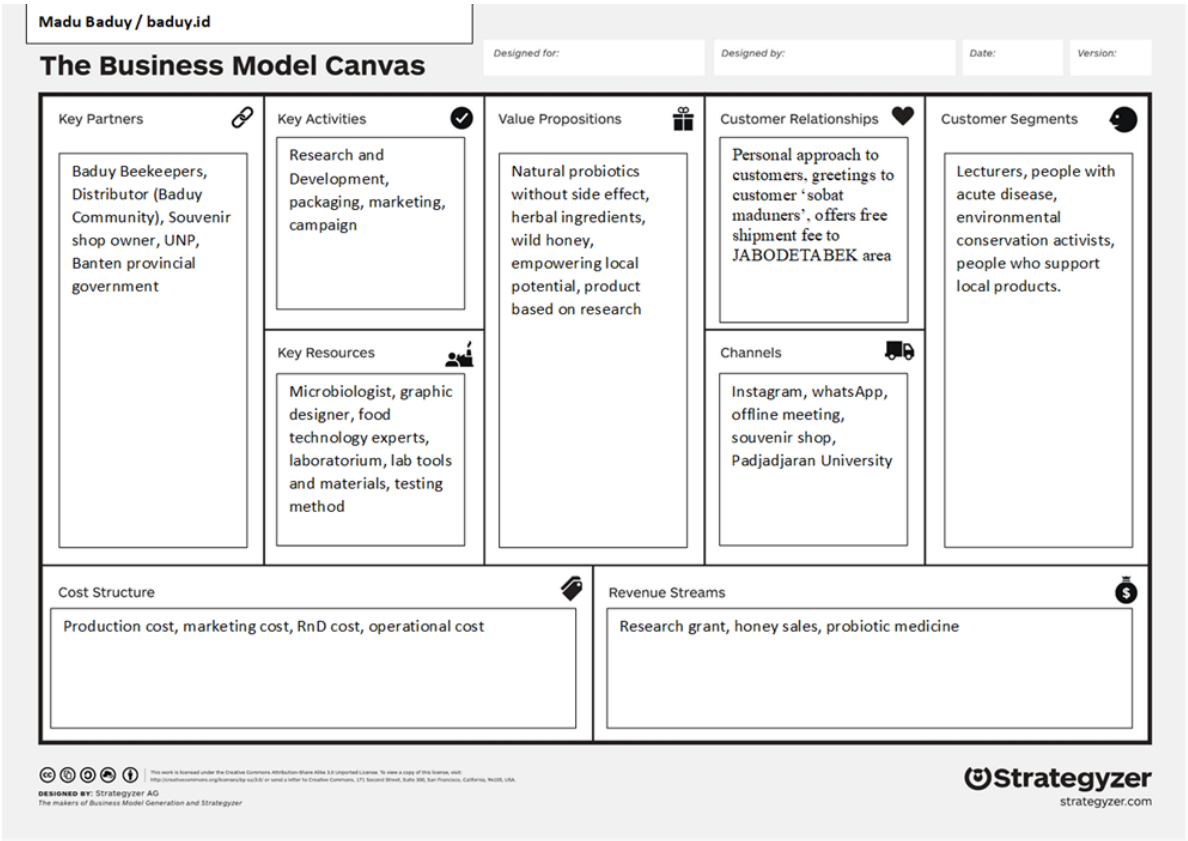


Figure 34 BMC of Madu Baduy

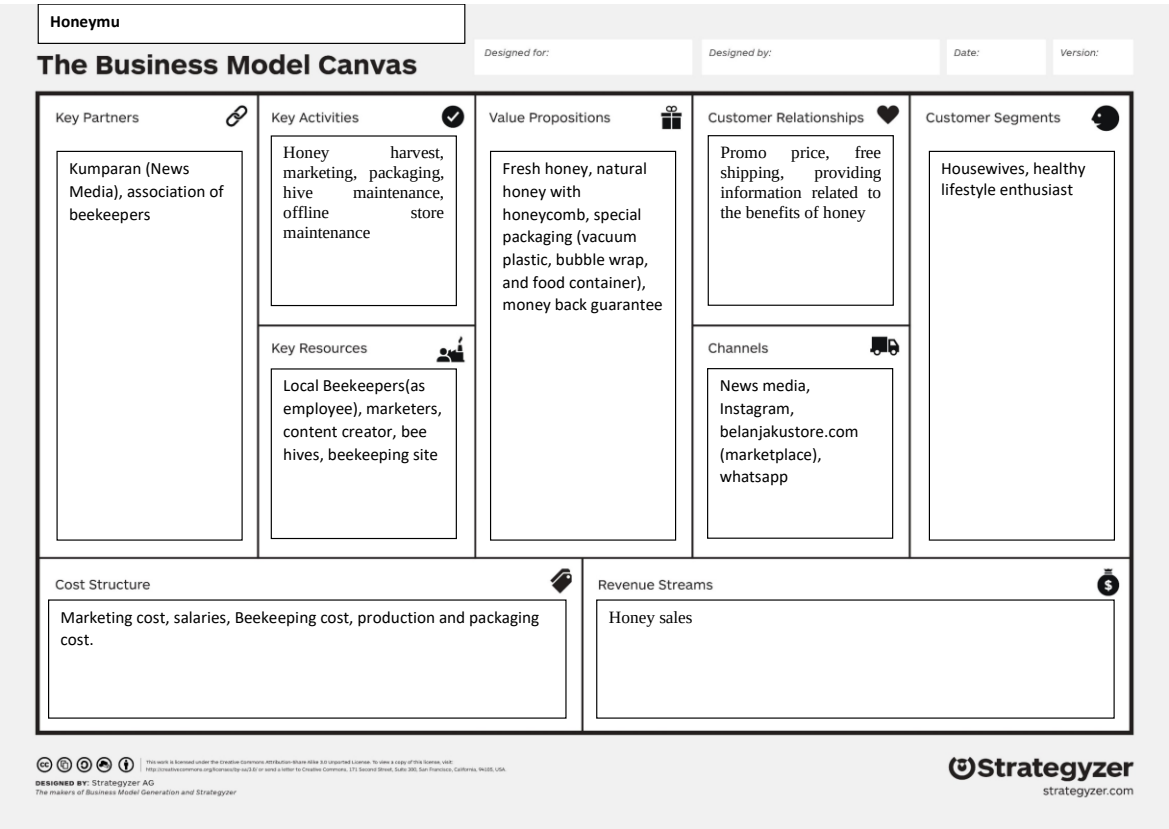


Figure 35 BMC of Honeymu

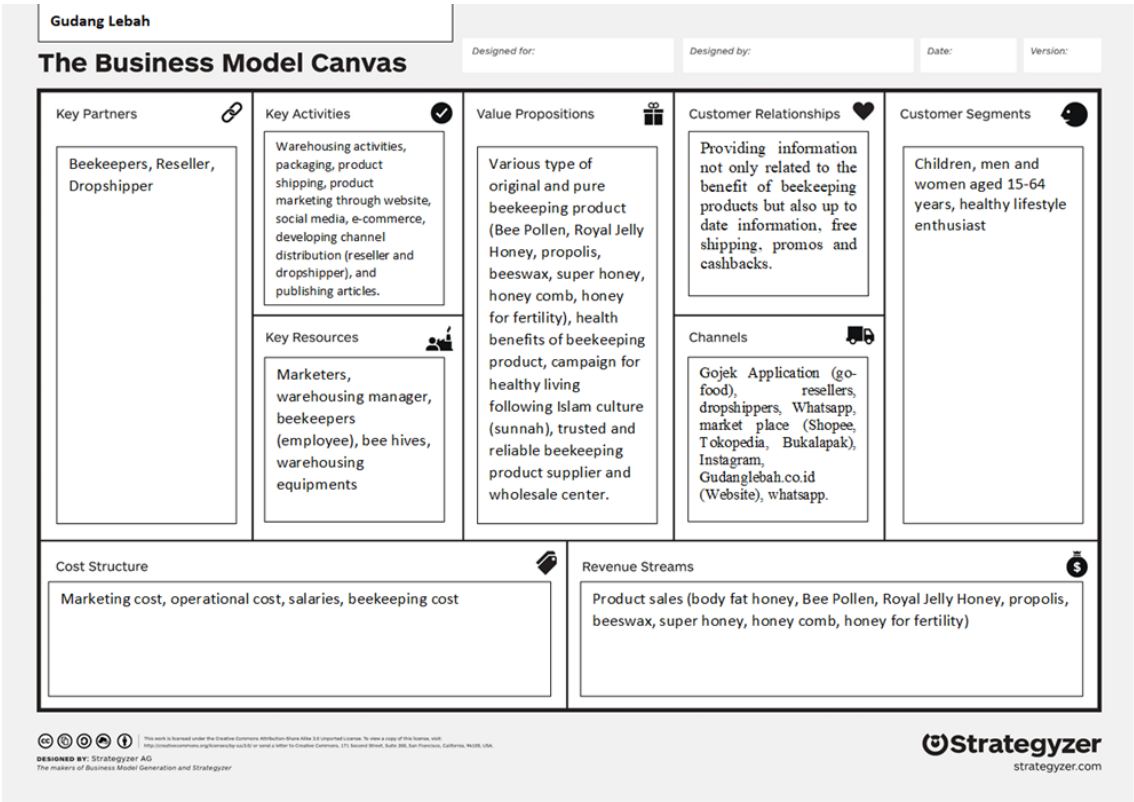


Figure 36 BMC of Gudang Lebah

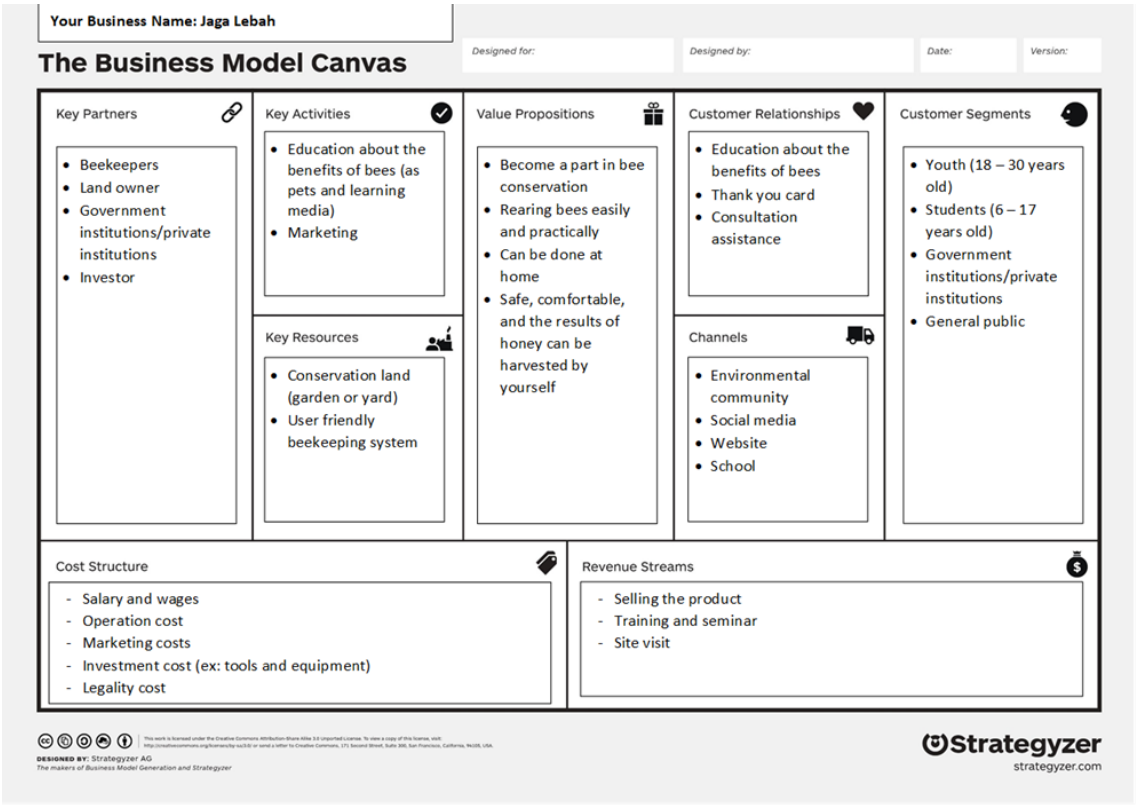


Figure 37 BMC of Jaga Lebah

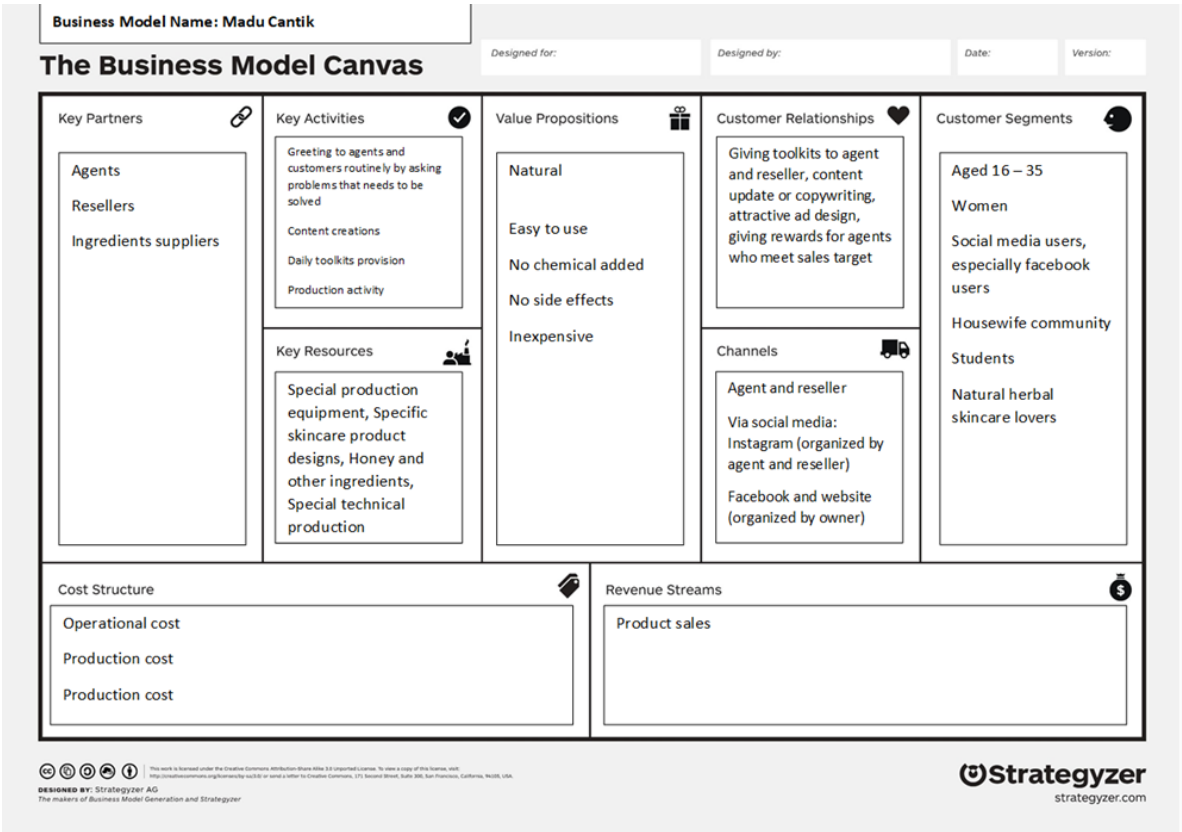


Figure 38 BMC of Madu Cantik

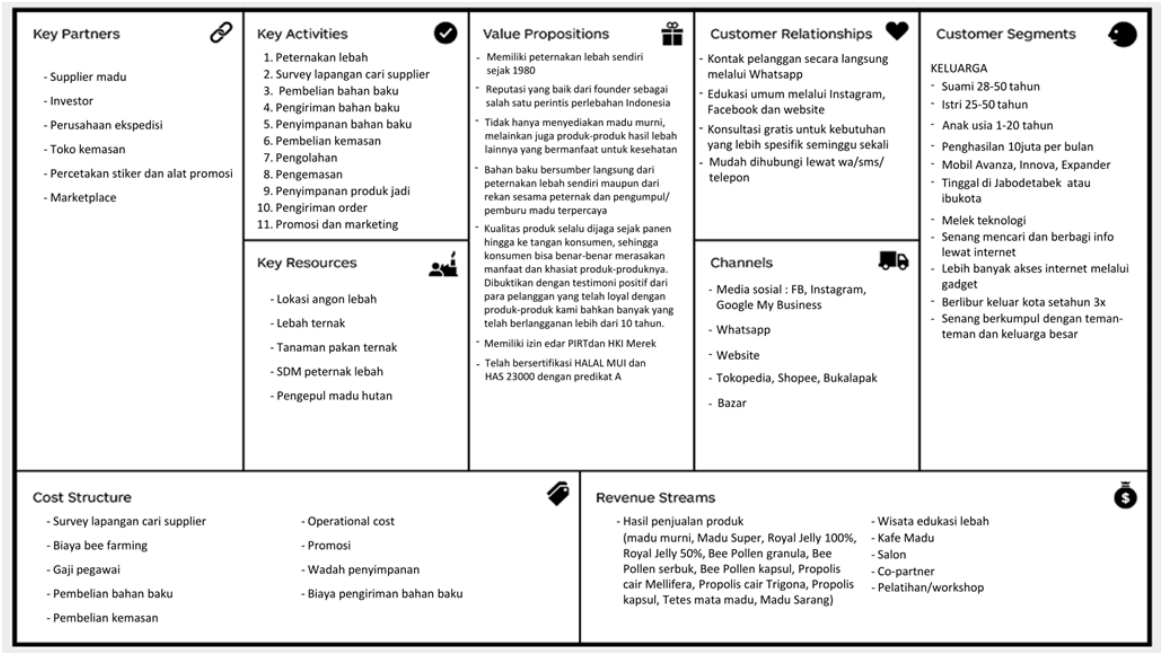


Figure 39 BMC of Madu Bina Apiari (This BMC was updated by the owner request after the rating process finished)

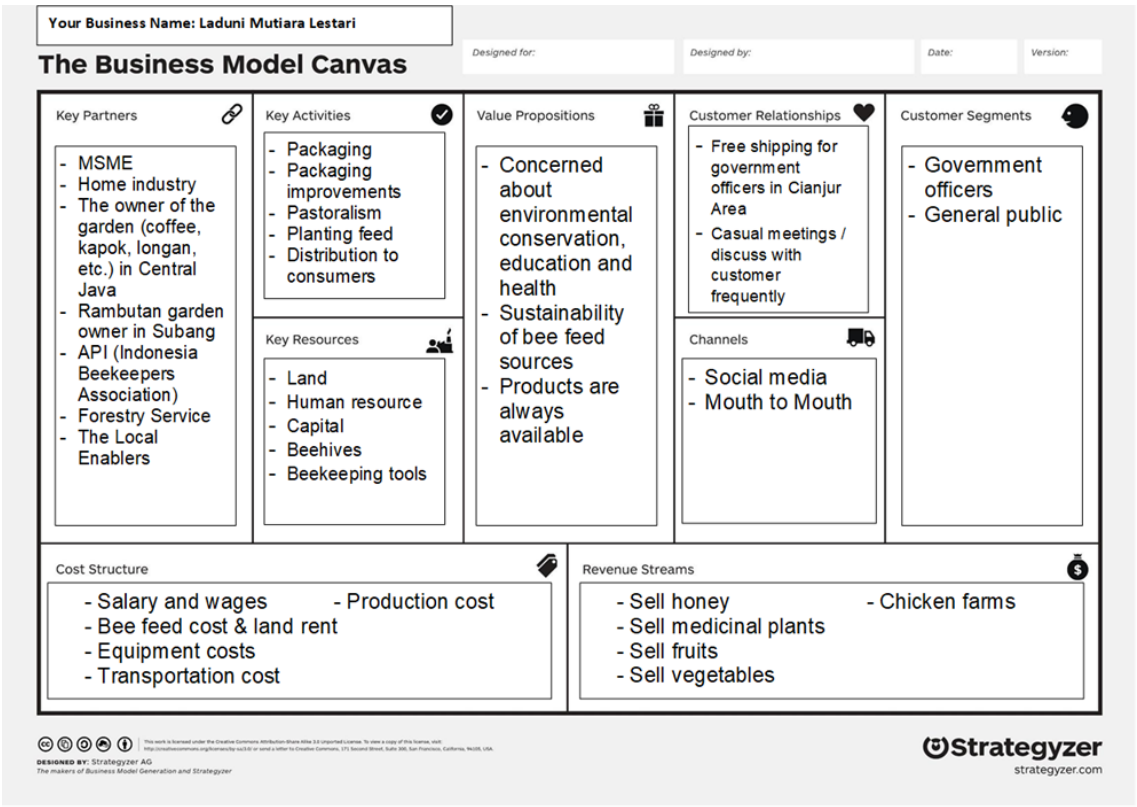


Figure 40 BMC of Laduni Mutiara Lestari

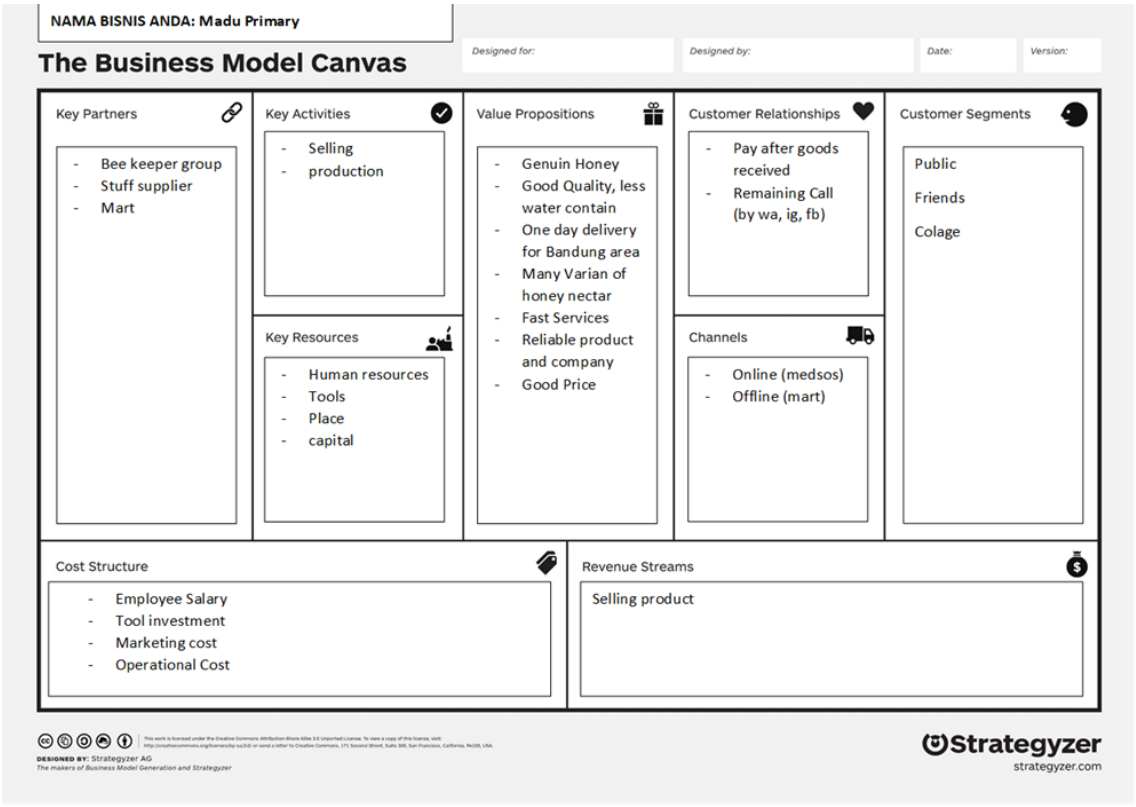


Figure 41 BMC of Madu Primary

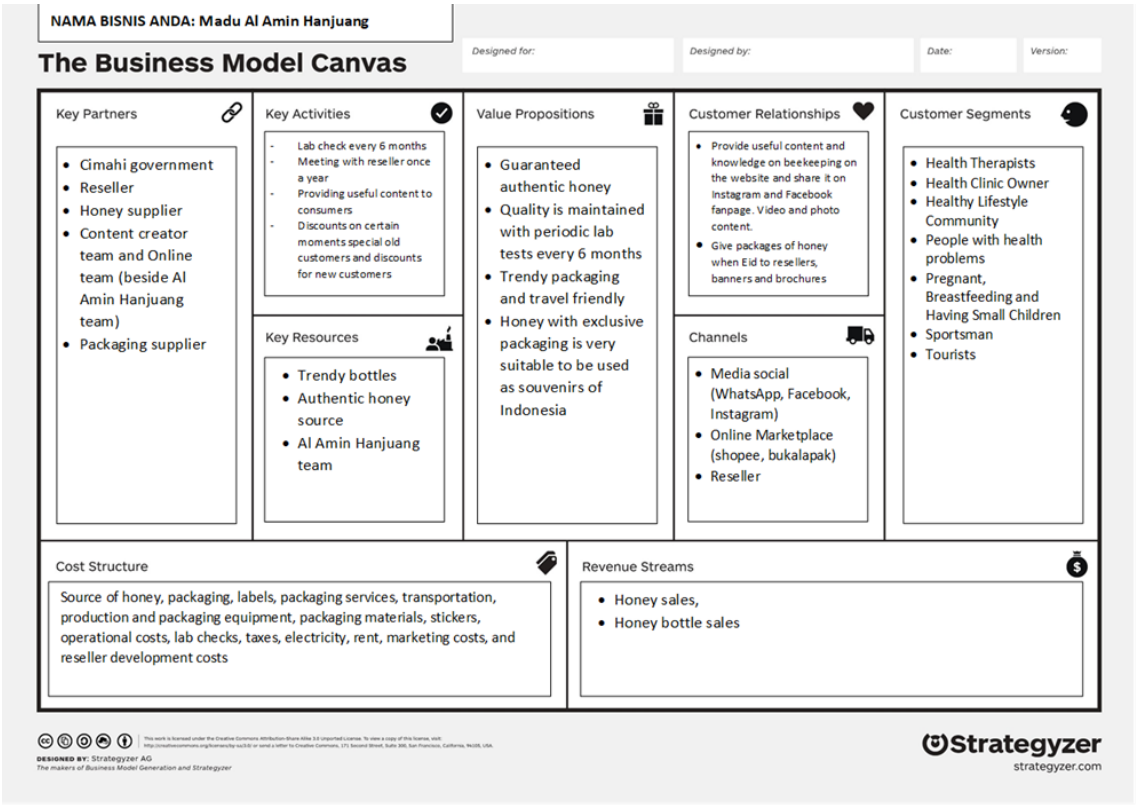


Figure 42 BMC of Madu Hanjuang

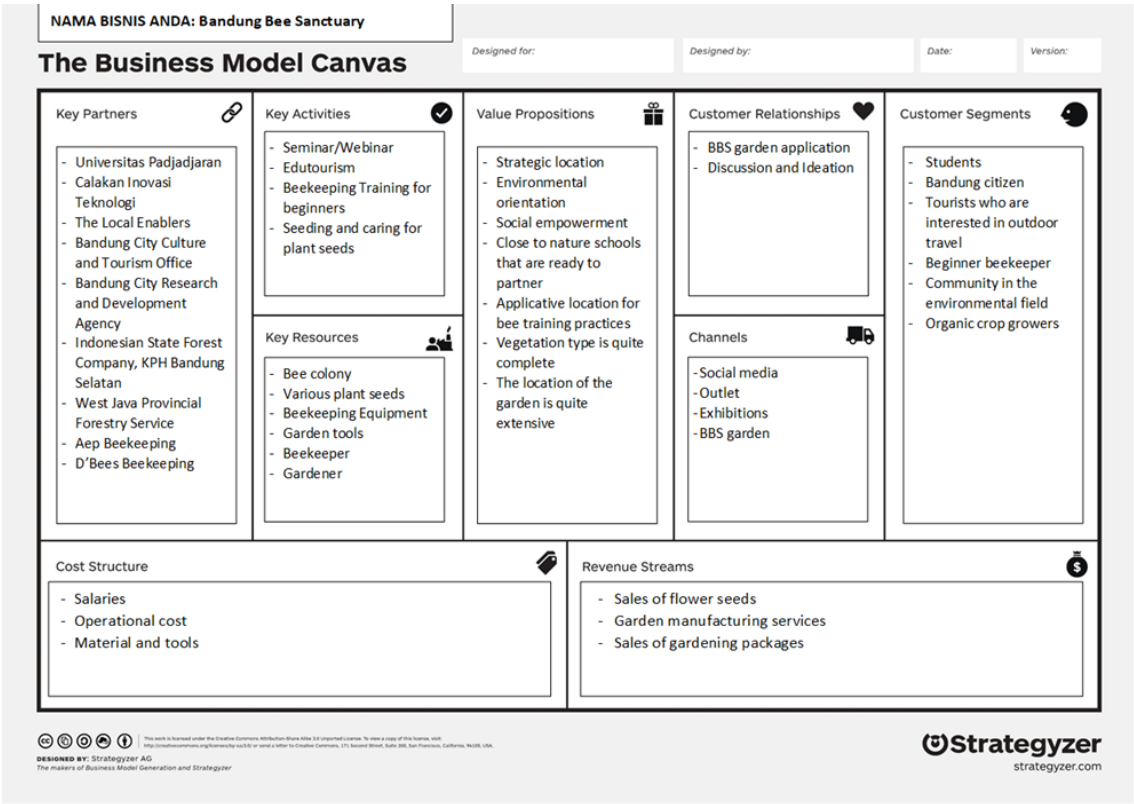


Figure 43 BMC of Bandung Bee Sanctuary

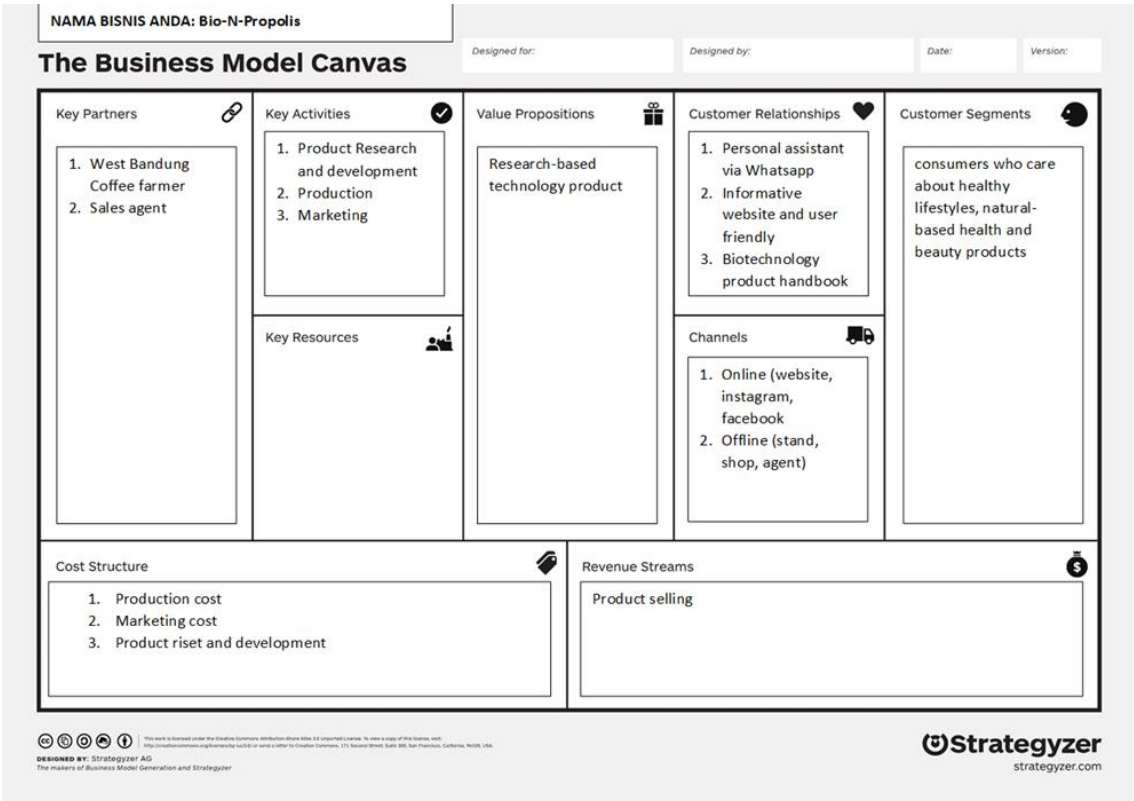


Figure 44 BMC of Bio-N-Propolis

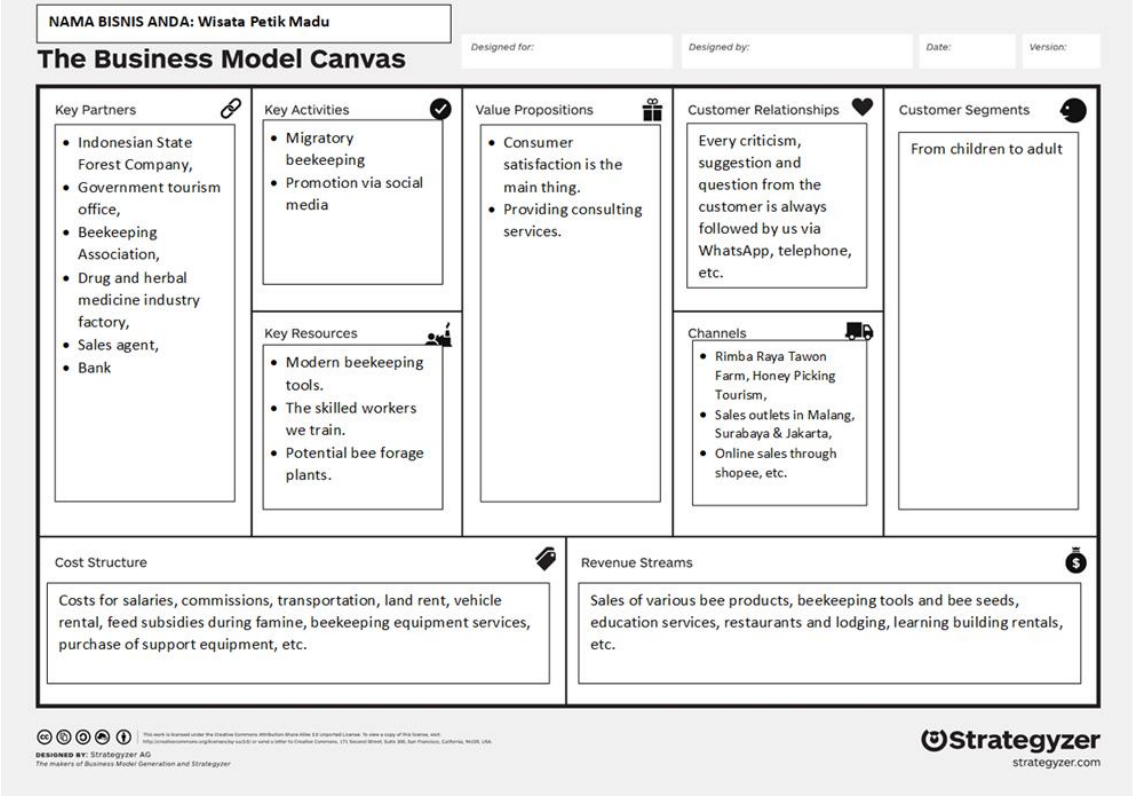


Figure 45 BMC of Wisata Petik Madu

Annex V Business Model Canvas Europe

Software solutions for beekeepers

Designed for:	Designed by:	Date:	Version:
Potential enterprise	LLU team	15.05.2020	1.0

Key Partners	Key Activities	Value Propositions	Customer Relationships	Customer Segments
* Software developers * Software testers * Freelancers	* Development of different software products including mobile apps and web services in relation to the beekeeping sector * Promotion of the developed products	* Stylish, user-friendly, cross-platform, mobile and web-based software solutions for the beekeepers	* Mainly online * Active phone cal center (helpdesk)	* Industrial beekeepers * Large scale beekeepers * Technologically advanced beekeepers
	Key Resources * Workstations * Programming software * Testing software		**Channels** * Online marketing and advertising platforms * Agricultural and beekeepers' trades, conferences * Presentations to beekeeping associations	

Cost Structure	Revenue Streams
* Primary costs are related to software development process * Secondary costs arise from marketing and dissemination of software products	* Main revenue stream from selling or subscription on software products

Figure 46 BMC of Software solutions for beekeepers

Power supply solutions for monitoring systems

Designed for:	Designed by:	Date:	Version:
Potential enterprise	LLU team	15.05.2020	1.0

Key Partners	Key Activities	Value Propositions	Customer Relationships	Customer Segments
* Battery manufacturers * Solar panel manufacturers * Alternative energy solutions providers	* Developing power supply options for monitoring systems, e.g., alternative energy solutions (solar power systems, wind power systems) * Buidling power supply solution from ready to use components	* Able to provide power for the monitoring system for its constant operation without grid power supply	* Virtual relationships * Communications mainly online * Service call center for maintenance purposes	* Bee colony monitoring system providers * Bee technology adapters * Bee technology enablers * Beekeeping hobbyists/ enthusiasts * Electronic engineers
	Key Resources * Capital for engineers * Materials for power systems (solar cells, wind turbines (motors), electronics for charge controllers etc.), batteries (e.g., lithium, lead acid)		**Channels** * Online * Paid advertisements * Various distribution channels	

Cost Structure	Revenue Streams
* Manufacturing costs * Research and development costs to improve power efficiency * Marketing costs	* Primary revenue stream comes from sale of power supply solutions

Figure 47 BMC of Power supply solutions for monitoring systems

3D Case for bee colony monitoring system	Designed for: Potential enterprise	Designed by: LLU team	Date: 15.05.2020	Version: 1.0

Key Partners	Key Activities	Value Propositions	Customer Relationships	Customer Segments
* 3D printing companies * Designers * Raw material (e.g., ABS, PLA) providers	* Designing of the casing for monitoring system * Printing of the case	* Designed, printed case is ready to be used for bee colony monitoring system installation	* Mainly virtual relationships * Communications using online channels	* Bee colony monitoring system providers * Beekeeping hobbyists/ enthusiasts
	Key Resources * Human capital in skilled 3D designers * Necessary equipment (3D printers, raw materials) * 3D design software * Workstations		**Channels** * Online * 3D product exhibitions * Advertisement channels	

Cost Structure	Revenue Streams
* Value driven * Variable costs (depending on case size and the amount of material needed)	* Fee for case design service * Fixed price per amount of 3d printed cases

Figure 48 BMC of 3D Case for bee colony monitoring system

Development of PCB (printed circuit boards) for monitoring systems	Designed for: Potential enterprise	Designed by: LLU team	Date: 15.05.2020	Version: 1.0

Key Partners	Key Activities	Value Propositions	Customer Relationships	Customer Segments
* Circuit board manufacturing enterprises * Electronic engineers	* Designing of the circuit board based on monitoring system specification * Component soldering to the PCB	* Designed, assembled, soldered monitoring system's circuit board ready to be installed on site for bee colony parameter monitoring	* Mainly virtual relationships * Communications using online channels	* Bee colony monitoring system providers * Bee technology adapters * Bee technology enablers * Bee researchers
	Key Resources * Circuit board designing software * Soldering equipment * Circuit board manufacturing equipment		**Channels** * Online * Dedicated exibitions	* Beekeeping hobbyists / enthusiasts

Cost Structure	Revenue Streams
* Value driven * Variable costs (depending on pcb count and necessary components)	* Fee for PCB design service * Fixed price per amount of printed circuit boards

Figure 49 BMC of Development of printed circuit boards for monitoring systems

SAMS data warehouse deployment and hosting

Designed for:	Designed by:	Date:	Version:
Potential enterprise	LLU team	15.05.2020	1.0

Key Partners	Key Activities	Value Propositions	Customer Relationships	Customer Segments
* IT companies * Web-service providers * Cloud server providers	* Deployment of the SAMS data warehouse * Maintenance of the data warehouse * User support with linking bee colony monitoring systems with the data warehouse	* Ability to monitor bee colonies in real time * Ability to see colony statuses remotely * Ability to decide on necessity of visiting the apiary * Providing cloud data warehouse to end users in an agile, flexible and secure form	* Virtual relationships * Communications mainly online * Phone communication channels and built-in support channels in the warehouse	* Small to industrial scale beekeepers * Bee scientists * Bee hobbyists * Research institutions
	Key Resources * IT infrastructure * SAMS data warehouse deployment procedure * Source code		**Channels** * Online * Presentations to the beekeeping assoications and at the agricultural and beekeeping events	

Cost Structure	Revenue Streams
* Cloud server operational and maintenance costs	* Monthly or Yearly fee for data warehouse service * Fixed price per registered colony

Figure 50 BMC of SAMS data warehouse deployment and hosting

Business Model Canvas

Observe your Hive

Designed for:	Designed by:	Date:	Version:
Potential enterprise	UNI KASSEL	24.07.2020	1.0

Key Partners	Key Activities	Value Propositions	Customer Relationships	Customer Segments
Customers who "rent a hive" SAMS monitoring system producer Beekeepers who lend their hive Enterprise who is running the internet platform	Start-up manufactures the hives incl. SAMS monitoring system or has a key partner who produces the system Beekeepers lend their hive to a customer via internet platform Potential enterprise bringing beekeepers and customers together	The customers who rent a beehive can always observe their colony and there is a considerable added value compared to an anonymous sponsorship. Beside the honey produced by the rented hive, there is a strong educational dimension. Bees can be observed any time and strengthens the bond to the product.	Long-term relationship. Personal assistance. FAQs on website.	Ecologically interested customers who want to know where their honey comes from. Beekeepers who want to sell their honey with add. value
	Key Resources Honey; IT & internet structure; beekeepers know-how; SAMS montoring system;		**Channels** Online, organic shops	

Cost Structure	Revenue Streams
Marketing costs Bee hives and bee colonies from associated beekeepers Human resources Internet platform	Sale of bee hives sponsorship

Figure 51 BMC of Observe your HIVE

Business Model Canvas

Monitoring of bee colonies for queen breeding

Designed for:	Designed by:	Date:	Version:
Potential enterprise	UNI KASSEL	24.07.2020	1.0

Key Partners
Bee breeders

Scientists

Key Activities
Start-up manufactures the hives incl. SAMS monitoring system or has a key partner who produces the system

Breeding activity aided by sensor data for breeding trait identification and monitoring

Key Resources
Bee breeding coloniesbee; breeders know-how; SAMS montoring system; data analysts

Value Propositions
Identification of indicators and development of prognosis models from the above-mentioned collected data for early detection of latent swarming tendency, winter brood and varroa tolerance by means of data exploration

Reduction of invasive interventions (visual control) in the bee colony to minimize negative influence on the breeding colonies

Real-time detection of desired selection characteristics, thus faster reactions to undesired selection characteristics and thus minimization of losses

Objectification of the evaluation of breeding traits by soft sensors

Customer Relationships
Long-term relationship.

Channels
Scientific journals, breeders' conferences

Customer Segments
Apiary industry in general

Cost Structure
HIVE system manufacturing
Bee hives and bee colonies from associated beebreeders
Human resources

Revenue Streams
Third-party funds, knowledge transfer

Figure 52 BMC of Monitoring of bee colonies for queen breeding

Business Model Canvas

Rent a Hive

Designed for:	Designed by:	Date:	Version:
Potential enterprise	UNI KASSEL	24.07.2020	1.0

Key Partners
Bee keepers; Scientists

Key Activities
HIVE systems are loaned to interested beekeepers. The received data will be evaluated and can be used by both sides (scientific and application-oriented)

Key Resources
Bee colonies; beekeeper know-how; SAMS montoring system; data analysts

Value Propositions
Obtain more bee data from different regions to improve bee behaviour related prediction

Customer Relationships
Long-term relationship.

Channels
Scientific journals, apiary conferences

Customer Segments
Apiary industry in general

Cost Structure
HIVE system manufacturing
Bee hives and bee colonies from associated beekeepers
Human resources

Revenue Streams
Third-party funds, knowledge transfer

Figure 53 BMC of Rent a HIVE

Business Model Canvas

Designed for:	Designed by:	Date:	Version:
Potential enterprise	UNI KASSEL	24.07.2020	1.0

Key Partners	Key Activities	Value Propositions	Customer Relationships	Customer Segments
Scientists	Hive system is a very flexible sensor monitor system, which can also be used for other scientific questions. The system will be equipped with the appropriate sensors and the control software is adapted according to the requirements. An example could be the long-term measurement of nitrate contents of surface waters.	Knowledge gain; data aquisition	Long-term relationship.	Scientific community
	Key Resources SAMS montoring system; data analysts		**Channels** Scientific journals	

Cost Structure	Revenue Streams
HIVE system manufacturing Human resources	Third-party funds, knowledge transfer

Figure 54 BMC of HIVE as a flexible monitoring tool

Business Model Canvas

Designed for:	Designed by:	Date:	Version:
Potential enterprise	UNIGRA	18.05.2(	1.0

Key Partners	Key Activities	Value Propositions	Customer Relationships	Customer Segments
*hive manufacturer (optional) *SAMS monitoring system producer (optional) *bee breeder *beekeepers	*Start-up manufactures the hives incl. SAMS monitoring system or has a key partner who produces the system. Depending on the needs of customers, there are two possibilities to sell the service/product. **1) Customer provides a person who has the necessary knowledge about bee biology and beekeeping . They only want to buy the system and the license for the data warehouse:** *Selling (SAMS) monitoring systems together with observational or standard hives including bee colonies to educational institutions. *Personal assistance if problems appear on-site, *provide and maintain the data warehouse for the incoming system data. **2) Customer do not have a person with necessary knowledge:** *start-up provides system (including the bee colonies), * Personal assistance if problems appear on-site, *data warehouse *offer of educational programs *regular management of bee colonies(optional)	*educational institutions are able to improve their internal course programme. *With the product, students learn about bee biology, beekeeping and data analysis through monitoring systems *Strengthen the image of bees.	*Long-term relationship. *Personal assistance. *FAQs on website.	*Educational institutions such as *schools *universities *beekeeping training sites
	Key Resources *Physical: office building, storage options, IT infrastructure, company car *intellectual: beekeeping know-how, customer database *others: human resources, financial resources.		**Channels** *online (website, social media) *fairs *pro-active access to potential customers.	

Cost Structure	Revenue Streams
*Marketing costs *bee hives and bee colonies from partners (optional) *human resources *insurance *rent for office and storage facilities *research and development costs...	*sale of system (bee hive, bee colony, monitoring system; transaction-based) *service revenue *licence for data warehouse and other IT related services *sale of educational programms (optional) *regular management of bought systems (optional)

Figure 55 BMC of A buzzy lesson - Providing monitoring systems and bee colonies to educational institutions

Project website: www.sams-project.eu

Project Coordinator contact:

Stefanie Schädlich
Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH
Wielinger Straße 52
82340 Feldafing, Germany
stefanie.schaedlich@giz.de