



Bacchus

EDIBLE INSECTS

An Industrial Analysis Report of Mealworm

“How westerners can save the world by extending their diet with a healthy and delicious ingredient”

Contents

1 Why Insect

2 Short Overview of the Insect Industry Today

3 Key Drivers to Grow the Insect Industry

4 Mealworm Flour as a Solution

5 Norms

6 Law

7 Technology

8 Market

9 Supply Chain

10 Ideal Business Model

11 Conclusion

Why Insect 1

Short Overview of the Insect Industry Today 4

Key Drivers to Grow the Insect Industry 5

Acceptance among western people to eat insect 7

Legislative security 10

Production cost barrier 14

Focus on mealworms 15

Presentation 16

Academic research in insect nutritional properties 20

Academic research in ecological impact 21

Mealworm flour as a solution 25

Norms 26

Acceptance of mealworm flour 28

Health issues in mealworm flour 30

Law 32

Current Legislation in the main markets for mealworm flour 33

Food safety plus impossibility to rear mealworm on waste at the moment 34

Prospects on legislation for mealworm flour 36

Technology 40

Current processes in insect industry / standardization and industrialization of insect products 42

Potential technologies for insect industry 43

Our own production improvement solutions 45

Market 46

Impact assessment of mealworm flour 48

A competitive analysis of mealworm flour 49

Conclusions 50

About Us



Melinda Palit

Marie. M

Iker Saenz

Matthias. F

Max Dorr

The possibility of something new that keeps me going everyday. I like the new ideas about how people interact towards each

The possibility of something new that keeps me going everyday. I like the new ideas about how people interact towards each

The possibility of something new that keeps me going everyday. I like the new ideas about how people interact towards each

The possibility of something new that keeps me going everyday. I like the new ideas about how people interact towards each

The possibility of something new that keeps me going everyday. I like the new ideas about how people interact towards each

“Describe Bacchus in one sentence. Use some cool words”

Bacchus is the Roman God of wine and plentiousness, agriculture and fertility of nature. We chose a Roman god, and not the Greek god Dyonisos, because the Greeks were the artists of ancient times whether the Romans were the engineers!

Our goal is to provide the world with a plentiousness of food, delicious food. Just as the plentiousness and the delicious wine Bacchus symbolizes. As engineers, we want to combine human innovation in agriculture with the use of the fertility of nature to make this happen.



Bacchus



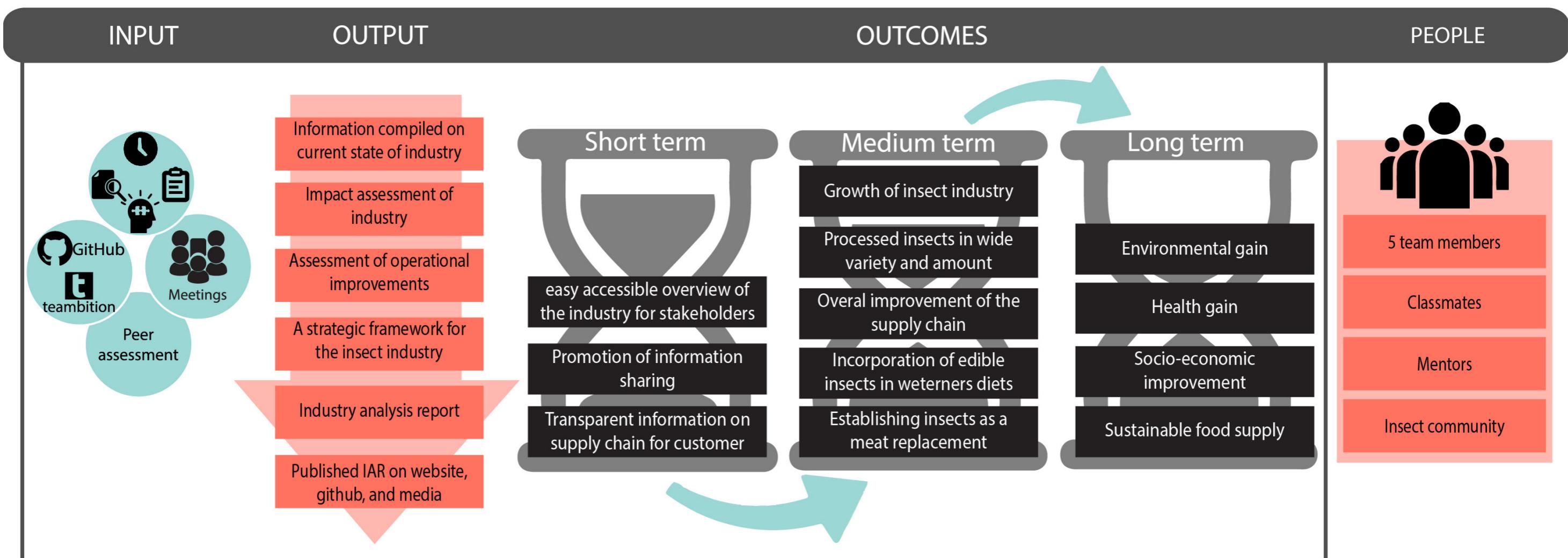
LOGIC MODEL



Goal: To provide western society with healthy, sustainable & delicious source of food



Problem Statement: Industrialization of insects as food





Why Insects?

"we will write a overview or the conclusion of this chapter. other than conclusion or anything is also oka, as long as we can talk a lot about it. perhaps needs 2-3 paragraph. I'm not sure either. we will write a overview or the conclusion of this chapter. other than conclusion or anything is also oka, as long as we can talk a lot about it. perhaps needs 2-3 paragraph. I'm not sure either"



Insect as a new source of food

"insert something here whatever it is to make it look pretty"

In this modern era where hunger kills more people every year than AIDS, malaria & tuberculosis combined (World Food Programme, 2015), we are fascinated with the idea of insect as a new-reliable source of food. This idea is also supported by the UN Food and Agriculture Organization, as quoted from bbc.com said that eating insect could help boost nutrition and reduce pollution; thus eating more insect could help fight world hunger (BBC, 2013).

As we know that consuming insect is still an unpopular idea especially in western country, a further exploration about edible insect will be a good call as it will provide more information and people will get to know it better.

So, why insect? Regardless of its looks that most of people don't fancy, insect as food is not only contain high nutrition (protein, vitamins and minerals) that can be found in fish and meat, but also way healthier as it contains less fat (as for the ratio). Harvesting insect is way easier than harvesting cows, pigs and sheep; they need less food to raise, emit fewer greenhouse gases, and by consuming insect we also help reduce pest insects without using any insecticides. Last but not least, farming insect can become a new form of business that can be done in the developing tropical countries (which usually suffered for poverty) where those insects mostly live.

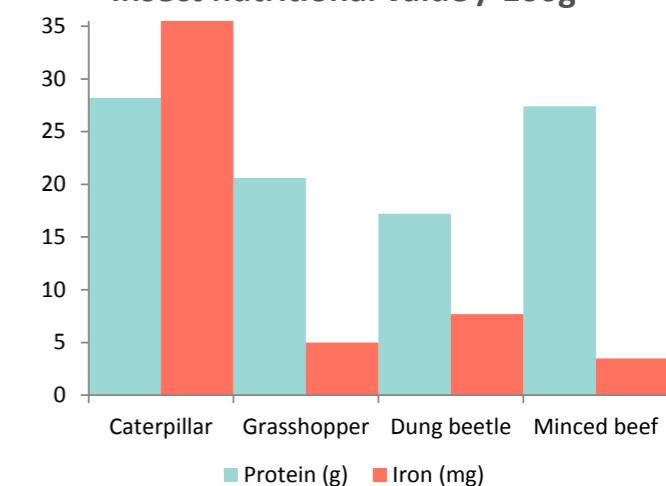
Here are the brief explanations of the advantages of eating insects (Huls, et al., 2013)

- Environmental opportunities: the environmental benefits lie in the high feed conversion efficiency of insects. For example, crickets require only 2kg of feed for every 1 kg

of body weight gain. Insect can be reared on organic side-streams (including human and animal waste) and can help reduce environmental contamination. It emits fewer greenhouse gases and less ammonia, require significantly less land and water, and compared with mammals and birds, insect also pose less risk of transmitting zoonotic infections to humans, livestock and wildlife (although this topic needs further research).

- Nutrition for human consumption: insects are highly nutritious and healthy food source with high fat, protein, vitamin, fiber and mineral content. For example the composition of unsaturated omega-3 and six fatty acids in mealworms is comparable with that in fish, and the protein, vitamin and mineral content of mealworms is similar to that in fish and meat.
- Insect as animal feed: insect-based feed products could have a similar market to fishmeal and soy, which are presently the major components used in feed formulae for aquaculture and livestock.

Insect nutritional value / 100g



Source: Montana state university

“Process that bla bla bla bla bla bla bla bla bla” blabla

There are thousands of insect's species around the world and more than 1900 species have reportedly been used as food. Globally, the most common insects consumed are beetles (Coleoptera). This is not surprising given that the group contains about 40% of all known insect species. The insect family has a great number in terms of species. The figure below shows the number of insect species, by order, consumed worldwide (Huls, et al., 2013).

As can be seen in the graph above, the difference of the insect quantity consumed worldwide is quite big in the coleopteran order. This brings an interest for us to narrow our focus on coleopteran order, which is beetle. Another interesting fact occurs as we learn more about beetle; it turns out mealworm that is already quite famous as an exotic food, is a larval form of beetle. There are quite numbers of information and articles about mealworm as food, which indicating that some people already acknowledge it as food; thus it brings positive advantage to our projects. Not only mealworm wins in quantity and fame, it is also contain high nutrition (dried): 46-53% protein, 28% fat, 6% fiber, 5% water, environmentally safe, simple production process (we

- Processing: insects are often consumed as whole but can also be processed into granular or paste forms. Extracting proteins, fat, chitin, minerals and vitamins is also possible. At present such extraction processes are too costly and will need to be further developed to render them profitable and applicable for industrial use in the food and feed sectors.
- Livelihood and economic improvement: insect gathering and rearing as minilivestock at the household level or industrial scale can offer important livelihood opportunities for people in both developing and developed countries. It also can offer employment and cash income, for example in developing countries in Southern and Central Africa and Southeast Asia, the process of insect gathering, rearing and processing is easily within reach of small-scale enterprises.

believe so because it's small and have no hard shell like beetle), and better yet- have a short



SNAPSHOT

The World Hunger

As world hunger refers to the want or scarcity of food in a country (Oxford English Dictionary, 1971), The United Nations Food and Agriculture Organization estimates that about 805 million people of the 7.3 billion people in the world were suffering from chronic undernourishment in 2012-2014. That means 1 in 9 people were suffering for that (World Hunger, 2015).

Regardless of the decreasing number of hungry people that can be seen in the table presented above, world hunger is still a major issue that needs a special attention. There are lots of things that people have done to help reduce the number. Most of them are by increasing the production rate in agriculture sector.

Undernourishment around the world, 1990 - 2 to 2012 - 4
Number of undernourished and prevalence (%) of undernourishment

	1990 - 2(Numb)	1990 - 2(%)	2012 - 4(Numb)	2012 - 4(%)
World	1.014,5	18,7	805,3	11,3
Developed regions	20,4	<5	14,6	<5
Developing regions	994,1	23,4	790,7	14,5
Africa	182,1	27,7	22,6	20,5
Sub-Saharan Africa	176	33,3	214,1	23,8
Asia	742,6	23,7	525,6	12,7
Eastern Asia	295,2	23,2	161,2	10,8
South-Eastern Asia	138	30,7	63,5	10,3
Southern Asia	291,7	24,0	276,4	15,8
Latin America & Caribbean	68,5	15,3	37	6,1

Source: FAO The State of Food Insecurity in the World 2013 p.8

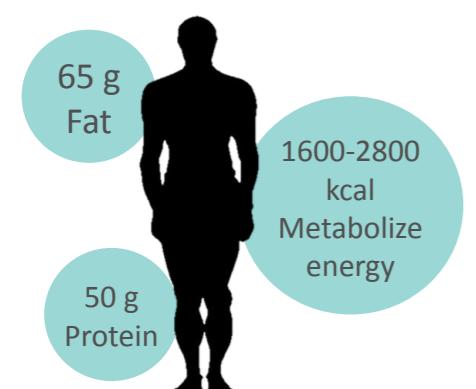
However is it true that the main reason of world hunger is because of we don't grow enough food to feed everyone? It turns out the growth of global agriculture's productive potential has so far been more than sufficient to exceed population growth (Food and Agriculture Organization, 2012). The reason of the world hunger is mostly because of poverty, because the poor people can't afford the food.

The dependence of agriculture source of food is what makes the distribution of food produced uneven. Therefore, we need a new source of food that is reliable to support; or even better – substitute the common source of food

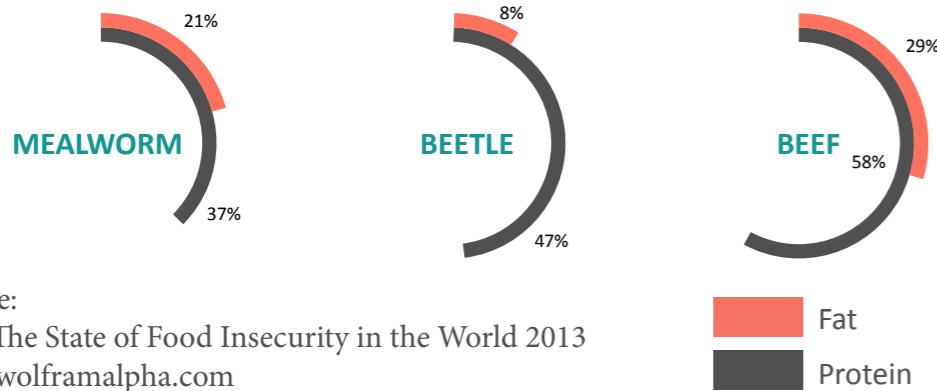
INSECT AS NEW SOURCE OF FOOD

Nutritional Value

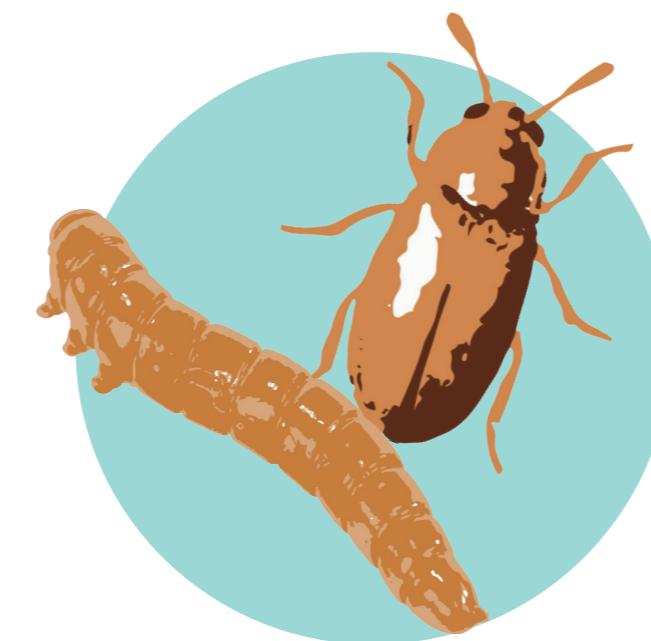
Human Nutrition Daily Need



Ratio of nutrition content with daily recommended value

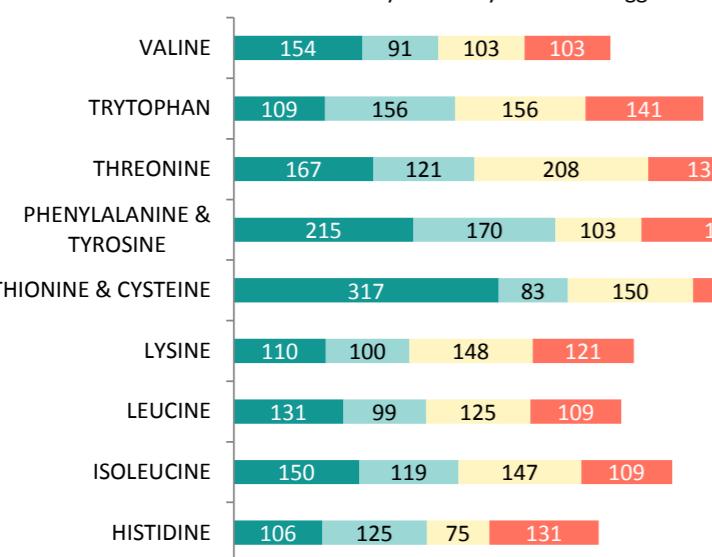


Source:
FAO The State of Food Insecurity in the World 2013
www.wolframalpha.com



ESSENTIAL AMINO ACID CONTENT

■ Mealworms ■ Soy ■ Whey ■ Milk & Egg



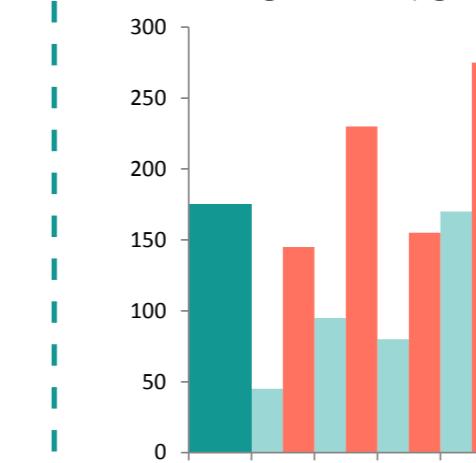
ENTOMOPHAGY IS FAMOUS!

80 PERCENT OF NATIONS EAT INSECTS TOTALLING 2 BILLION PEOPLE WORLDWIDE

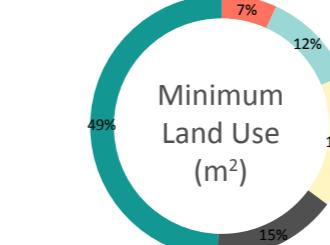
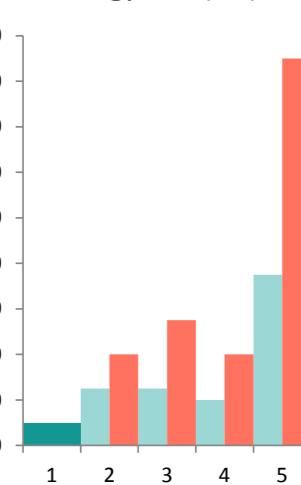
Source: www.ediblebugfarm.com

Ecological Aspects

Global Warming Potential (kg CO₂ -eq)

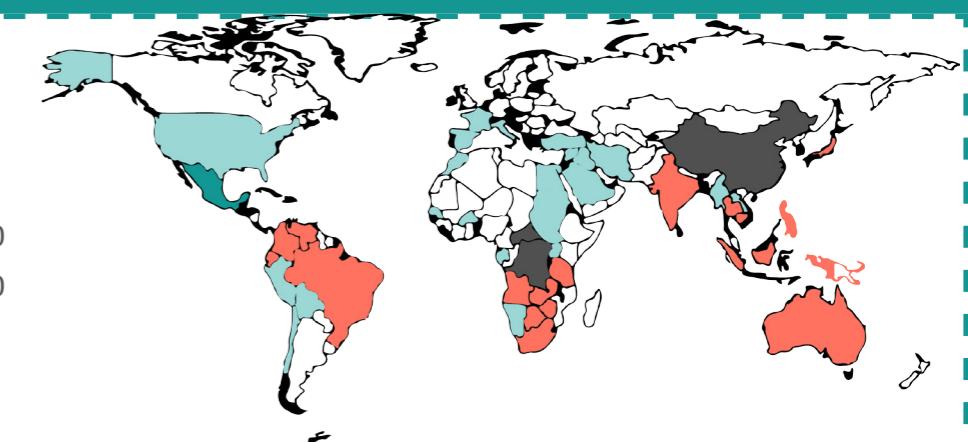


Energy Use (MJ)



Source: FAO The State of Food Insecurity in the World 2013

Number of edible insect species around the world



Source: FAO The State of Food Insecurity in the World 2013

Source: www.ediblebugfarm.com

Key Driver

"we will write a overview or the conclusion of this chapter. other than conclusion or anything is also oka, as long as we can talk a lot about it. perhaps needs 2-3 paragraph. I'm not sure either. we will write a overview or the conclusion of this chapter. other than conclusion or anything is also oka, as long as we can talk a lot about it. perhaps needs 2-3 paragraph. I'm not sure either"



Acceptance among westerners

A key challenge towards selling insects for human consumption will be people in the West accepting insects as a food source. A better understanding of why most Westerners do not like the idea of eating insects nowadays (FAO, 2013) can indeed help finding creative solutions to improve global insects acceptance.

Let us put the currently observed Western disgust towards insect consumption in a historical prospect. Agriculture was born in the Fertile Crescent, a region located in western Asia, ten thousand years ago before quickly spread to Europe. From a nomad hunter-gatherer way of life, men started to domesticate plant and animals to secure their food sources, thus became sedentary (Henry, 1997).

The domesticated animals were mainly large ones, not only because they were present in these regions but also because they could supply wool, leather, warmth, milk and strength (for farming or transportation) in addition to meat; what insects cannot. Moreover, the seasonality of insects -especially in these non-tropical regions where most of them hibernate- add-

ed to the uncertainty of their supply made them an unreliable source of food for Westerners, and especially urban areas.

In parallel, along with the plant domestication, insects became a pest able to destroy entire harvests. This is one of the reasons why Westerners culturally associate all insects with nuisances. Examples such as mosquitos, ticks, fleas or flies able to transmit illnesses to humans; or termites eating the wood of their constructions only deepened Westerners' aversion against insects. Not to mention the shapes of insects, seen as monstrous and repulsive by many a Westerner.

Westerners also rapidly associated insect consumption with some primitive and therefore contemptible behavior inherited from the hunting-gathering times; forgetting pleasantly that the Greeks and Romans themselves ate insects in ancient times (DeFoliard, 1999). Because of this historical and cultural background, disgust is the first reaction of many a European when suggested to eat insects. But just as every

social norm, it can be changed within some time.

Indeed, some encouraging experiments carried out in Belgium (Rudy Caparros

"Westerners culturally associate all insects with nuisances and see their consumption as primitive"

Megido, 2014) showed that on 105 respondents from both genders and different ages, although 46.6% of them had a negative attitude towards it; 77.7% of them were willing to try insects. This demonstrates curiosity and desire to try novel food.

Besides, the popularity of insect tasting events such as "Restaurant" in the UK (Rentokil) shows a growing interest of Western people in eating insects. Even more encouraging: more and more restaurants cooking insects open their doors in the Western countries (Insect Europe).



Legislative security

In many countries, there is no regulation for insects as food and feed. This is one of the big barriers to insect mass-production as investors fear to put money in a lawless -therefore hazardous- business. Indeed, as long as you do not know about the safety standards you shall have to respect, it is impossible to make big investments in industrial breeding and trans-

lines provided by the Codex Alimentarius (a database providing international reference standards for food and feed) either. On the opposite, there are laws on maximum permissive levels of insect contamination in food products for humans such as grains (FAO, 2013).

In the United States, insects as food do not correspond to any category of the

“There are no international guidelines provided by the Codex Alimentarius, hence no clear regulation at the moment”

formation processes and you cannot make sure customer will buy your products. There are no international guide-

FDA (Food and Drug Administration), meaning that there is no legislation on this issue.

In EU, edible insects are considered as Novel Food because they were not consumed to a significant degree by Europeans before May 15, 1997. Therefore, the European Novel Food Regulation (EC n° 258/97) should apply, restricting their trade as long as their safety has not been investigated (European Parliament, 1997).

The European Commission is currently financing a scientific study in partnership with China plus other countries in Europe and Africa that aims at better evaluate the potential health risks and advantages of edible insects. It will be finished by April 30th 2016. (PROTEINSECT, 2015).

One might hope that its completion will accelerate the trade authorization of edible insects for human consumption in the European market. A hope sustained by the coming revision of the Novel Food

“In EU, edible insects are considered as Novel Food (EC n°258/97), which interpretation is ambiguous”

regulation planned in 2016.

The interpretation of this European Novel Food Regulation (EC n° 258/97) is somewhat ambiguous. Insects as human food are partly – and always unofficially– tolerated in countries where

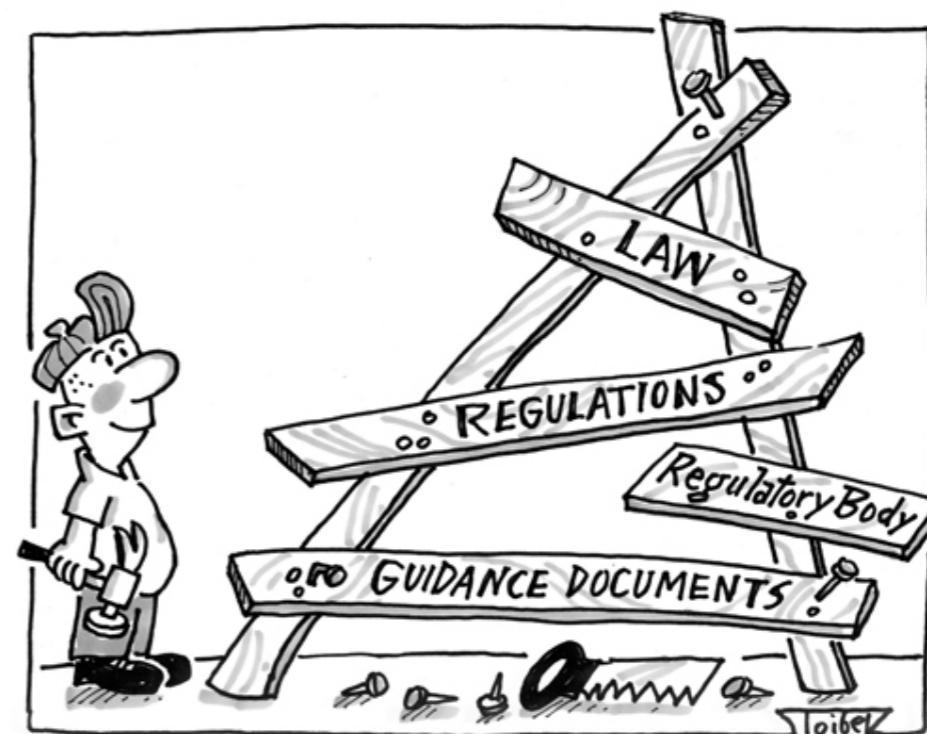
legislation is unclear, like in France or the UK (Day, 2015). At the moment it is up to each state-member to decide for itself on specific cases.

In Spain for example, insects are allowed to be eaten in restaurants who buy them for foreign suppliers, but not to be sold for consumption. Health authorities vetoed indeed an edible insect shop in Barcelona in 2008 (Benítez, 2013).

On the other hand, Belgium became the first European country authorizing 10 species to be commercialized

in December 2013 (Flanders Today, 2014).

The Netherlands also have a very permissive attitude towards insects and are probably the most advanced European country in that issue. A Dutch Supermarket called Jumbo decided to put insects on its shelves last November 2014 (Brody, 2014). The Dutch Laboratory of Entomology in Wageningen University is very active. Besides, this university co-organized with the FAO a conference titled “Insects to feed the world” last May 2014. The situation is very likely to evolve in the coming years.



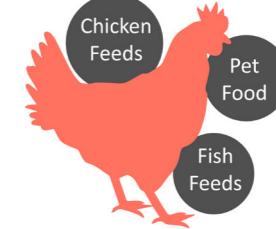
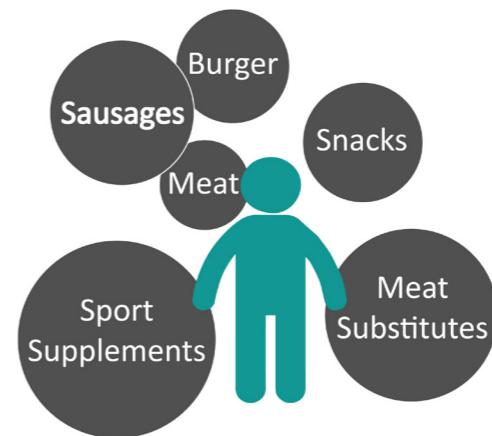
Market Study

"we will write a overview or the conclusion of this chapter. other than conclusion or anything is also oka, as long as we can talk a lot about it. perhaps needs 2-3 paragraph. I'm not sure either. we will write a overview or the conclusion of this chapter. other than conclusion or anything is also oka, as long as we can talk a lot about it. perhaps needs 2-3 paragraph. I'm not sure either"



Market to Seize

The current market for insects in the West is very small. The customers mainly consist of early adopters, foodies, people who like to try new or exotic things and alike. Also, it starts to become popular at a party snack. Because the market is that new, analyzing the current customers and markets says very little about the future market insects as food can seize. We believe, to get an idea of the possible impact of insects as food, we should look at current similar markets where insects, and more in particular insect flour, can be a substitute. For these markets, we want to get an idea of the economic, ecologic and health impact insects can have. We identified the following markets insects can possibly substitute is for human consumption and animal consumption:

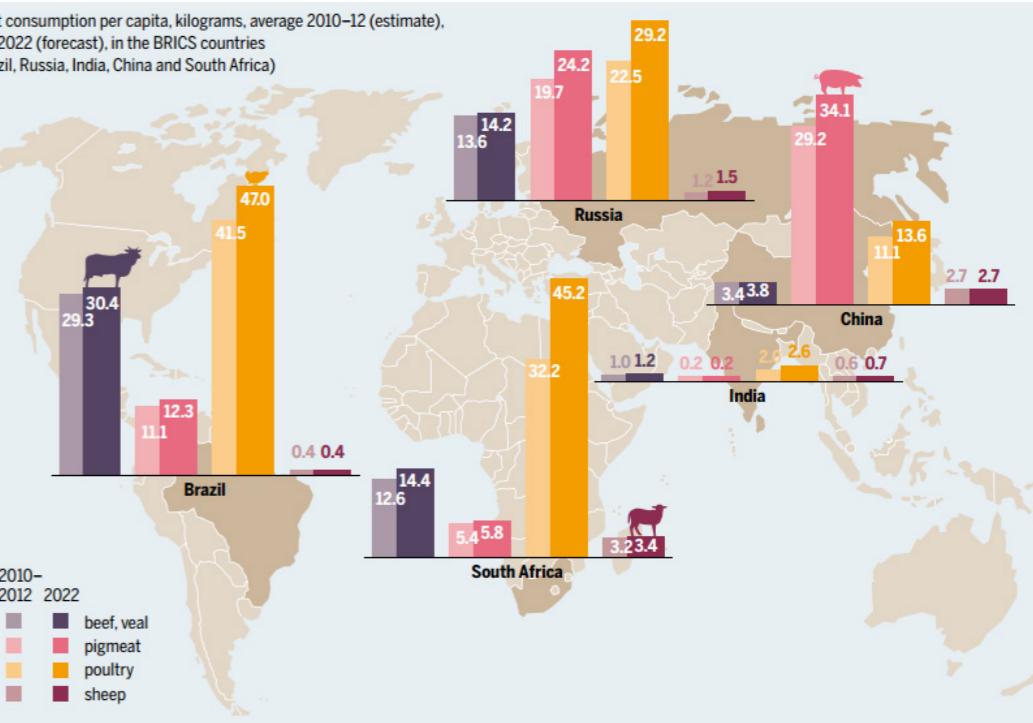


Human Consumption

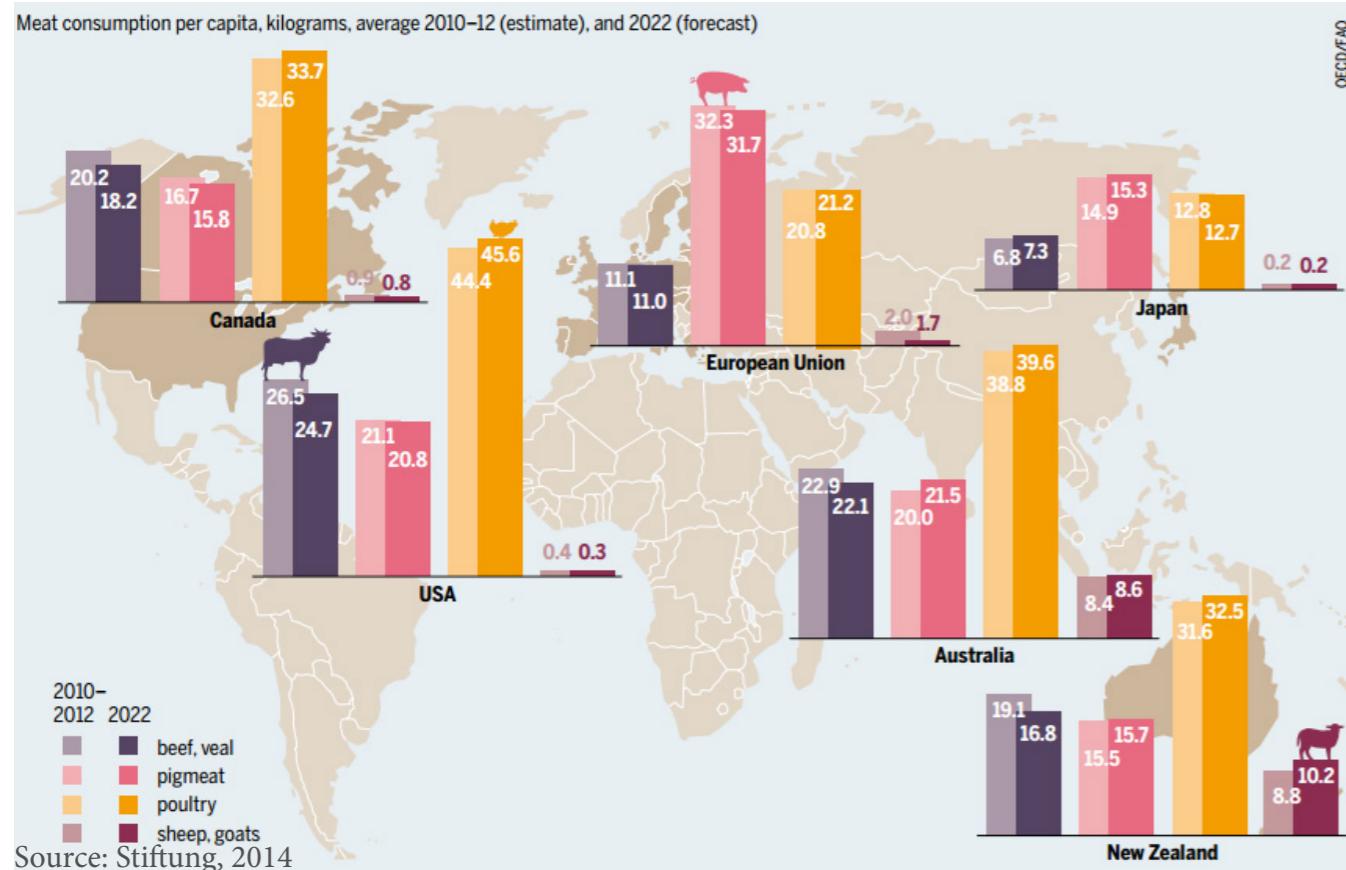
Meat

Insects are animals. Therefore, food made out of insects is meat. The most obvious market for insects is therefore the meat market. The Meat Atlas by Heinrich Böll Foundation and Friends of the Earth shows how much meat is consumed per capita in selected countries.

As you can see, this is a huge market. However, although meatproducts made from mealworm flour can theoretically replace any meat, their most direct concurrents are processed meats. A product based on mealworm flour can substitute a processed meat



Source: Stiftung, 2014



Sausages

Business Analytic Center calculated the total European sausage production totalling 5,3 million ton at a market size of 19,5 billion euro(BAC). It's a highly fragmentated market with individual tastes that differ seriously among countries. The US market of sausages and other processed meat products totalled 20,4 billion \$ in 2009(Dun & Bradstreet). The average price of a kg of sausages in the USA is 9,7 \$ / kg (Wolfram Alpha).

ResearchMoz gives the current issues impacting this market : health, product quality, freshness and the search of new flavors and ethnic compatible products(ResearchMoz). A transparent production process of mealworm flour as main ingredient in a sausage can adress most of these issues

Burgers and Meatballs

The global market for beef is expected to reach USD 2151 billion by 2020(GrandViewResearch). In 2012, 67400 kilo tons of beef was produced.

Of that, 43,9% or 29500 kilo ton was sold as ground beef. The retail price of a burger in the USA is historically high due to the lowest cattle herd in 60 years and not helped by environmental problems such as the drought in Texas(MarketWatch). The retail price of a kilo of ground beef in american supermarkets reached 9,15 \$(AGWeb).

Cheaper burgers, containing more fat and other health affecting ingredients are still widespread. This is one of the main reasons that poor people in developed countries have a higher chance to be fat. However, the general public can react severely when they discover that inferior ingredients are used in their burgers, as the recent horsemeat scandal showed (the guardian, 2013).

A burger made of mealworm flour with transparent ingredients, nutritional content and production process can be competitive on this market. It will first attract part of the people who eat high quality burgers. If economies of scale grow and price goes down, it can even play a big role

Meat Substitutes

Meat substitutes in the West are products that are related to meat in terms of taste and nutritional value, but with plant based proteins as the main ingredient. Sustainability and health concerns are the main reasons to eat these products. Therefore, while the market was originally mainly intended for vegetarians, now the average health conscious urban citizen becomes the target. With the apparent health and ecological impact insects can have, it is very plausible that insects will be a viable alternative for the meat substitutes market.

In 2013, this market had an estimated size of 3.2 billion \$ worldwide. Today, 80 % of the market is soy based(MarketsAndMarkets Analysis). The main products are tofu, tempeh, seitan and quorn. Lots of small players compete in this market. The 5 biggest players are : Quorn Foods Ltd. (U.K.), Blue Chip Group (U.S.), Vbites Foods (U.K.), Amy's Kitchen Inc. (U.S.), and Cauldron Foods (U.K.) (PR Newswire). Market Analysts believe the market will grow with a CAGR of 4.4 to 6.4% up to 6.4 billion \$ in 2019 (MarketsAndMarkets Analysis & RTS Resource). However, Western market analysts completely underestimate the size of the Chinese market, where tofu is a mainstream part of the diet. The tofu market alone was worth 11 billion \$ in 2014 in China and has been growing with a CAGR of 20% a year during the last 5 years. This growth is not expected to slow down as domestic demand is still increasing (IBISWorld).

In the USA, tofu sells for about 4 \$/kg . Vegie sausages sell for 12 \$/kg and vegie burgers sell for about 6 \$/kg (Indiana Soybean Board).

Sport Supplements

Sports supplements is quite a big market encompassing all bars, powders, drinks and alike that people eat or drink in addition to their normal diet to help their sport performance. Historically, the main customers of this market were young male adults wanting to grow their muscles faster after power workouts. However, more and more this market is becoming diversified and targets now all kinds of people who are doing sports to improve their health. Important in these products is that they contain exact amounts of the additional nutrition people want. This means a simple insect powder would probably not be able to become a resource for this market. But, if it is possible to extract the proteins and omega 3 and 6 fatty acids insects are rich of, they could become a resource for this industry. Another option is to play with the inputs. The nutritional value of insects can be influenced by the food you give them (Kathryn Redford). Bug Muscle is a company that will start with the production of insect based nutritional supplements for athletes in middle 2015 (www.bugmuscle.com).

Studying what analysts think about the size of this market gives some useful insights. In 2007, BCC Research forecasted that the total market size would be 91.8 billion \$ in 2013(BCC Research). In 2011, GIA estimated that the market would reach 67,1 billion \$ in 2017 while in a recent report they forecast a size of 61 billion \$ in 2020(Global Industry Analysts). It is clear that analysts tend to believe this market will grow way faster than it actually does. Also, almost 95% of this market is sports drinks, a category insect powder probably can't be an input for. The most consumed protein supplement is



Snacks

A lot of the startups trying out insects as food are targeting the snack market. Insects can be seen as a healthy and exotic snacks. Especially for parties this snack becomes popular

(List of startup snacks)

The global snack market is mainly concentrated in the USA and Europe. It is a very broad term, including sweets and candy, cookies, crisps, nuts, fruit and much more. In total, this market amounted for 374 billion \$ in 2014(Nielsen). However, with data from Euromonitor we can notice that healthy snacks, without fruits and nuts, have only a share of 3% in that market(bankingbusiness.com). Even more, the market share of healthy snacks within the total snack market is decreasing. This raises concerns about the sustainability of the business model of insects as a snack.

Animal Consumption

Makkar et al. state that a 60–70% increase in consumption of animal products is expected by 2050 (FAO). IFIF believes in an even more spectacular growth : meat consumption doubled by 2050 and fish consumption tripled (IFIF). The resources needed to supply all those animals with feed will be enormous. In this Industry Analysis report, we focus on producing mealworm flour for human consumption. If more mealworms are eaten, this will substitute part of the traditional meat eaten. But we have to acknowledge

that people will not completely change their diet from big animals to insects without any disasters obliging them to do so. Therefore, it is important to assess the size of the market of the feed of the animals we eat and check whether those markets can be penetrated by insects as well. Moreover, with such growth perspectives of an already huge market, completely neglecting animal feed cannot be justified in economic and ecological sense.



Skal



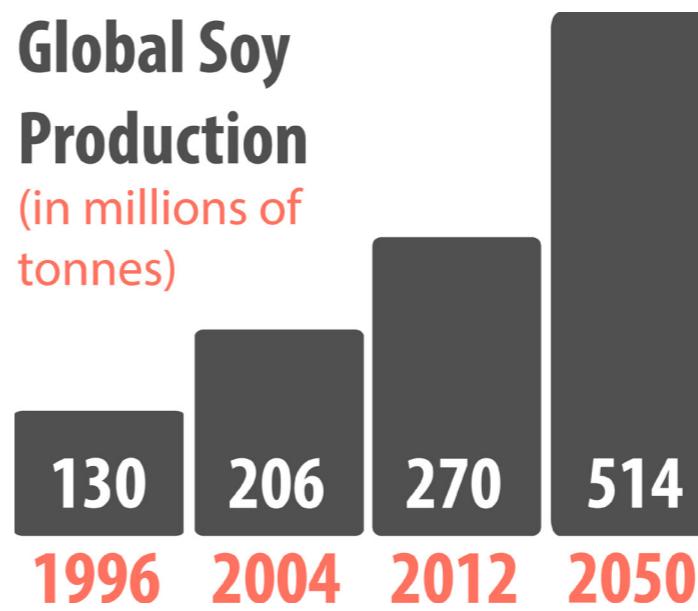
Animal Feed

The current total global market of animal feed has a size of 370-500 billion \$ per year (IFIF,Alltech). This results in almost 1 billion ton of feed per year. The main categories of animal feed are feed for poultry (444 million ton), pig (243 million ton), ruminant animals (including cow and sheep) (196 million ton), fish feed (40 million ton) and pet food (21 million ton) (alltech). The lower amount of feed for ruminant animals is due to the fact that they are still today mostly fed on pasture from grasslands.

Most animals grown for human consumption need a protein rich diet to grow. Therefore, corn and soy as protein rich grains, are the most popular animal feed. In addition, animals need sometimes animal protein to supply them with necessary amino acids. Fish meal is the most popular animal protein feed. The overreliance on grain-based animal feeds in industrial food animal production has negative consequences for animal health, the environment, and even human health(sustainable table). Grains for animal feed use 40% of total land use in agriculture(Kathryn Redford). WWF warns for the growth of soy production, as especially in South America the growth of soy farms is already af-

Insects provide a good alternative for protein rich grains as animal feed. A good start to learn something about insects for feed is the Kathryn Redford TedX talk 'what to feed our food' (TedX).

Makkar et al. give the state of the art of insects used as animal feed. 5 species of insects are promising as their nutritional quality is roughly comparable with current soy and fishmeal: black soldier fly larvae, the house fly maggots, mealworm, locusts–grasshoppers–crickets, and silkworm. The insects themselves can be fed by biological waste. In that case, they help towards a world with less waste while at the same time depleting less natural resources as traditional feed. Of course, a process that can ensure that the waste is not contaminated needs to be developed for such applications. Nowadays, European law does not allow to feed animals on waste. These regulations are a relict of the 1990s BSE crisis (BBC). 25-100% of traditional animal feed can be replaced by insects, depending on the insect and animal species. As supply of insects is nowadays still very small, poultry and fish feed will be the easiest to start supplying insect feed to. Other animals require a large supply of feed before they can switch to a new feed source. Data of mealworms used in animal feed is not yet widespread. It could replace feed for chickens if supplemented with methionine. If only 10% of chicken feed is replaced by mealworms, no supplementary products are needed. A case for catfish is investigated with the result that 40% of the feed can be replaced by mealworms (Makkar et al.).



Source: wwf.panda.org
fecting the rainforest.



Norms



"we will write a overview or the conclusion of this chapter. other than conclusion or anything is also oka, as long as we can talk a lot about it. perhaps needs 2-3 paragraph. I'm not sure either. we will write a overview or the conclusion of this chapter. other than conclusion or anything is also oka, as long as we can talk a lot about it. perhaps needs 2-3 paragraph. I'm not sure either"



Laws



"we will write a overview or the conclusion of this chapter. other than conclusion or anything is also oka, as long as we can talk a lot about it. perhaps needs 2-3 paragraph. I'm not sure either. we will write a overview or the conclusion of this chapter. other than conclusion or anything is also oka, as long as we can talk a lot about it. perhaps needs 2-3 paragraph. I'm not sure either"



Technology



"we will write a overview or the conclusion of this chapter. other than conclusion or anything is also oka, as long as we can talk alot about it. perhaps needs 2-3 paragraph. I'm not sure either. we will write a overview or the conclusion of this chapter. other than conclusion or anything is also oka, as long as we can talk alot about it. perhaps needs 2-3 paragraph. I'm not sure either"

Supply Chain



"we will write a overview or the conclusion of this chapter. other than conclusion or anything is also oka, as long as we can talk a lot about it. perhaps needs 2-3 paragraph. I'm not sure either. we will write a overview or the conclusion of this chapter. other than conclusion or anything is also oka, as long as we can talk a lot about it. perhaps needs 2-3 paragraph. I'm not sure either"



