The KTH Innovation Readiness Level™ Model – User Guide

This document is meant as a guide to make it easier to use the KTH Innovation Readiness Level model. It covers important things to consider when using the Model, both in general and in each of the specific Readiness Level scales.

Contents

The KTH Innovation Readiness Level™ Model – General Comments

- The KTH Innovation Readiness Level model is primarily applicable when you have a new idea (product/service/technology/concept/etc.) that you want to realize and take to the market.

- The KTH IRL model measures and describes the progress in the development from an idea to a fully implemented innovation on the market. It does not measure the quality or potential of the idea.

- The KTH IRL model gives a snapshot of how far you have come in the development process. There is no valuation in being high or low on the scales, it just gives a more objective view of current status.

- It is common that you go both up and down (often several times) in the different scales during the development. This is typically due to: 1) actual progress or setbacks, and 2) new insights and understanding of the market, industry, etc. that makes you re-evaluate how far you have come.

- The six Readiness Levels can be measured separately but they are connected and interdependent. You do not have to be at the same level in all Readiness Levels at the same time or advance symmetrically. However, big differences (more than 2-3 steps) can become inhibiting to the development and increase the risk of failure.

- All Readiness Levels are important, but the order reflects a hierarchy of interdependence. The customer (CRL) and the business model (BRL) influence the product/service (TRL) and vice versa. These three factors influence the IPR strategy (IPRL), and all together influence the team (TmRL). Finally, all of these factors influence the funding needed to take the idea to the market (FRL).

- The criteria on the different levels in the KTH IRL model define what you should have achieved to be on that particular level. They do not prescribe how you should achieve it. How you achieve it will depend on the specific idea and the specific context.

- The first page of each Readiness Level contains a high-level description of the criteria. The second page contains more detailed criteria. Which level of detail you use depends on what you are using the model for, but the general rule is that you have to have achieved all the criteria on a particular level to be on that level.

- The KTH IRL model is designed to be applicable to all kinds of ideas, and different ways of taking the idea to the market. It is, however, challenging to make the definitions general enough to fit many different types of ideas while at the same time specific enough to be practically useful. This means that in some use cases you may have to translate the general definition to a more project specific definition. Some of the definitions may not be relevant for all cases and in those cases, you just skip the non-relevant points and keep the relevant ones.

- To calibrate the scales and definitions to your spefic case it is often ueful to start thinking about, and defining, what level 9 on each Readiness Level means for your case.

The KTH Innovation Readiness Levels – Comments on the Specific Scales

Here are some specific comments that address common questions in each of the Readiness Levels that should make them easier to interpret and use in practice.

Customer Readiness Level – CRL

- CRL focusses on getting your "solution" out into the market so that it is being used and creates value.

- The CRL scale is divided in two main stages:

    o CRL 1-4: Understanding your customers/users.

    o CRL 5-9: Getting your "solution" in the hands of the customer/user and trying to sell it.

- In business models where the users don't have to pay for the product/service, the CRL focusses on the user and not the paying customer (hence use the criteria in CRL 6-9 about "users" and "active users"). In these cases the paying customer and the payment willingness is covered in the BRL scale.

Technology Readiness Level – TRL

- TRL focusses on the functionality of the "technology" (se comment below) and that it is "fit for purpose".

- We are using the TRL scale originally developed by NASA with some small modifications to make it easier to understand and apply to different types of ideas. In particular, we have tried to add explanations to key words and concepts in the definitions of the levels in the scale.

- We use the word "Technology" to stick to the terminology of the original TRL scale, but the word should be interpreted as the "solution" you want to develop regardless if it is strictly speaking a technology or not.

- It can sometimes be difficult to differentiate between the steps in middle part of the TRL scale – TRL 4, 5, 6, 7. Some typical differentiating factors to consider could be:

    o Size or form factor

    o Level of integration of subcomponents

    o "Finish" of the prototype – closeness to appearance of final product

    o Level of reality in the "relevant environment"

    o Development phase of the technology and/or components

    o Etc.

Business Model Readiness Level – BRL

- BRL focusses on creating a viable and sustainable business model around the idea. The business model can be commercial or non-commercial and for profit or non-profit.

- In this Readiness Level, we use the following key definitions:

    o "Business Model" = "A business model describes how an organization creates, delivers, and captures value". This can be described in several different formats, e.g. a Business Model Canvas, but also many other ways.

    o "Sustainable Business Model" = A business model where the Revenue ≥ Cost (over time) AND Positive contribution to environment and society > Negative contribution to environment and society (over time).

- We believe that going forward from now, you cannot have an economically viable business model over time without taking responsibility for your contribution to environmental and social sustainability as well.

- The BRL scale is divided in three main stages:

    o BRL 1-3: Describe your sustainable business model in increasing level of detail.

    o BRL 4-6: Simulate/calculate if the sustainable business model is viable based on hypotheses, assumptions, and feedback.

    o BRL 7-9: Test the sustainable business model in reality and confirm that it is viable.

- The term "*Key measures to increase positive and decrease negative environmental and social contribution*" in BRL 5 refers to the most important things you actively do to increase positive and decrease negative contribution. Examples could be choosing a bio based material instead of a fossil fuel based material, only working with suppliers with some relevant certification, paying workers better salaries, taking responsibility for recycling of you product, etc. The point is to verify that the business model is both practically feasible and economically viable when you take these measures into account.

IPR Readiness Level – IPRL

- IPRL focusses on controlling and using Intellectual Property Rights to increase the likelihood of successfully taking the idea to the market and creating value.

- It is very important to remember that all new ideas are based on, and contains, some sort of IPR, so IPRL is relevant for all types of ideas.

- The IPRL scale is divided in two main stages:

    o IPRL 1-4: Identifying, describing, and assessing the potential to protect your IPR.

    o IPRL 5-9: Taking active steps to protect and control your IPR according to a thought through strategy.

- When you have identified and defined the specific IPR in each particular project/idea, it is much easier to understand and interpret the criteria on all the higher levels of the IPRL scale.

Team Readiness Level – TMRL

- TMRL focusses on getting the right people together to go from idea to market and to make sure they have the best possibilities to perform well.

- The TMRL scale primarily deals with:

    o Competencies – that there is the right knowledge, skills, experience, etc. at each stage of the idea development.

    o Capacity – that there is enough work capacity of people with the right competencies to do the work necessary at each stage of the idea development.

    o Team alignment – that the people in the team are sitting in the same boat and rowing in the same direction.

- Competencies and capacity can be added by e.g. recruitment, training, consultants, partners, etc.

- The term "diversity" should be understood to encompass gender, culture, age, background, and other relevant factors. An ample body of research shows that when you are taking new ideas to the market (i.e. creating innovations), diverse teams perform better.

- The TMRL scale is divided in two main stages:

    o TMRL 1-4: The initial team to verify and develop the potential of the idea.

    o TMRL 5-9: The team to build a startup/organisation to realize the idea and take it to the market, where:

        ▪ TMRL 5-6: putting the founding team in place to start building the startup, and

        ▪ TMRL 7-9: building and scaling the organisation.

- The word "startup" typically refers to a commercial independent company, but it can also be non-commercial entities or other types of organisations. The point is that you want to build a team and an organisation to develop the idea and take it to the market (or at least closer to the market), and not primarily transfer the idea to another party (e.g. existing business/organisation) that develops it and takes it to the market.

- It is not necessarily the same persons validating the idea (TMRL 1-4) and building a startup (TMRL 5-9).

Funding Readiness Level – FRL

- FRL focusses on securing enough funding to develop the idea and to reach an economically viable and sustainable business model for the idea over time.

- The FRL is based on two core assumptions:

  - Successful innovation (taking new ideas to the market) depends on finding a viable and sustainable business model for the idea so that it can create value and impact over time on the market.

  - New ideas always require input in the form of people's time, money, and other resources to be developed before they can be sold or generate revenue/value in other ways, so there will always be a need for some sort of funding to cover the resource need before you reach a viable business model.

- There are many different possible sources of funding – e.g., internal funding from yourself or your organisation; external funding from investors, banks, funding agencies, etc.; customer funding from sales, pre-sales, joint development, etc.; and so on.

- The FRL scale primarily deals with:

  - What are you funding? – the idea/concept/project/business/activities you need funding for

  - How much funding do you need?

  - How much funding have you secured?

- The FRL scale is divided in two main stages:

  - FRL 1-4: Primary focus on funding to verify and develop the potential of the idea so that you can identify a viable business model.

  - FRL 5-9: Primary focus on being able to realise the business model and reach economic viability and sustainability over time.

- From FRL 5 and upwards there is a lot of focus on funding from external sources. In cases where external funding is not the chosen strategy, you can ignore the criteria that specifically relate to external funding (pitches for funding, discussions with investors, etc.), but still use the criteria that relate to keeping track of your funding need (budget, accounting, financial forecasting, etc.)

Identifying and Assessing the Positive and Negative Contribution to the Environment and Society

This section is meant to help identify relevant areas in which the business model could have a positive and negative contribution to the environment and society. This is an essential part of the "Sustainable Business Model" used in the Business Model Readiness Level.

Assessing a Sustainable Business Model

A "Sustainable Business Model" = A business model where the Revenue ≥ Cost (over time) AND the Positive contribution to the environment and society > Negative contribution to the environment and society (over time).

How to measure revenue and cost is well established. How to measure positive and negative contribution to the environment and society is less well established and cannot be done with just one single parameter, like money in the case of economic sustainability. The assessment of environmental and social sustainability will typically involve multiple parameters that have to be adapted to each specific case.

There are different approaches to measuring and assessing several of the parameters included in environmental and social sustainability. It is typically good to use existing established practices for assessments, e.g. CO_2 equivalents, but it is also important to not only look at these parameters and the specific numbers since the models often have very high error margins and there may be other highly relevant parameters to take into account in the specific case.

Why Identify Positive and Negative Contribution to the Environment and Society?

All products/services/etc. and their associated business models contribute to, and have effects on, the environment and society, both positive and negative. Identifying this contribution creates awareness among the people developing the idea and other stakeholders, and with awareness comes the possibility to take responsibility for the effects and to continuously work to increase the positive contribution and decrease the negative contribution.

Impact, Effect, and Contribution

Impact, effect, and contribution are some words that are often used when discussing sustainability in businesses and business models. All of them could be used in the definition of a sustainable business model.

We have primarily chosen to use the word "contribution" in the BRL. "Contribution" is more directly linked to your specific actions here and now, and it indicates that there is an intent and direction in what you do. It forces you to think about how you are changing something compared to how things are now.

"Effects", and in particuar "impact", can depend on many other factors in addition to your specific actions, and effects and impact can really only be measured in retrospect. Contribution, on the other hand, can be assessed continuously while you are doing it.

Assessing the effects and impact of your business model on the environment and society can be feasible and relevant when you have a business (or other type of organisation) up and running, but it is often complex and time consuming. In the development stage that the KTH Innovation Readiness Level model primarily deals with, we think that it is more relevant to talk about "contribution".

How to Assess Positive and Negative Contribution to the Environment and Society

When you identify and assess your positive and negative environmental and social contribution, you should look at two perspectives:

- The "solution" itself (the product/service/etc.) from a life cycle perspective. In the term "life cycle perspective", we include things like the raw materials used, how the product/service is produced, how it is used, and how it's taken care of after use.

- Your overall business or operations, i.e. everything related to how you make your business model work in practice, both directly connected to the product/service/etc. and other parts of the business model.

When you think about who you affect and how, you should look at:

- The stakeholders directly affected by your product/service and your business/operations, e.g. customers, users, employees, and the local environment where you run your operations and the product/service is produced, used, and disposed of.

- The stakeholders indirectly affected by your product/service and your business/operations, e.g. the local community around your customers/users/employees, society in general, and the environment in a broader perspective. (within reasonable limits)

Things to keep in mind:

- **The most important effect of identifying and assessing the positive and negative contribution is that you can consciously work on reducing the negative contribution and increasing, and leveraging, the positive contribution.**

- Scale matters. Sometimes a solution can seem to have more positive contribution initially when it's small scale, but at larger scale it may instead cause more negative contribution.

- A negative contribution can arise as a side effect of a solution. For instance, a solution may solve one problem but at the same time create new ones.

- You will probably identify several positive and negative contributions caused by the business model. Prioritize the contributions and think systematically about what you can do to diminish or remove the negative contribution and to increase the positive contribution.

- Focus on what's most relevant for your business model and your specific field of business.

- It can be hard to compare positive and negative contribution in different areas against each other, e.g. a reduction of CO_2 emissions by X tonnes but it requires the use of Y kg of toxic chemicals. There are no universal rules for how to make this assessment, it has to be evaluated on a case by case basis using relevant methods and models (when that exists), input from people with relevant expertise, and common sense.

- The main purpose of assessing positive vs negative contribution to the environment and society is not to come up with a specific quantified result, it is to be able to take responsibility for how your business model affects the environment and society.

Typical Areas of Positive and Negative Contributions to the Environment and Society

- The UN Sustainable Development Goals - https://sdgs.un.org/goals

- UN Global Compact - https://www.unglobalcompact.org/what-is-gc/mission/principles

- Environmental factors (non-exhaustive list of examples, with some overlap)

    o Greenhouse gas emissions

    o Air quality (particles, NOx, etc.)

    o Energy consumption

    o Water quality and management (drinking water, fresh water, seas/oceans, waste water)

    o Hazardous/toxic chemicals, materials, etc.

    o Biodiversity

    o Buildings, infrastructure, etc.

    o Materials use (virgin materials, etc.)

    o Land use

    o Soil quality

    o Etc.

- Societal factors (non-exhaustive list of examples, with some overlap)

    o Employment and income opportunities

    o Working conditions, labour practices

    o Education, knowledge, skills

    o Healthcare (access to, quality of, etc.)

    o Personal health and healthy habits

    o Privacy

    o Data security

    o Security

    o Equality and diversity

    o Influence

    o Laws and regulations

    o Etc.