Toolkit
Using Inventions in the Public Domain

Tool 6
Value Chain

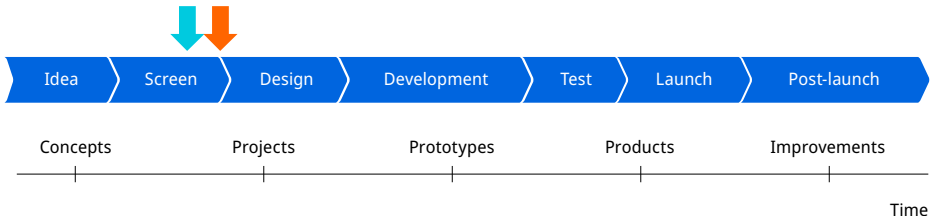
WIPO

Tool 6/ Value Chain

In this document we will explain how to use the Value Chain tool and interpret the results. The value chain is discussed in several places in the WIPO publication *Using Inventions in the Public Domain: A Guide for Inventors and Entrepreneurs* (2020), in particular in section 2.3 of Module III "Value chain analysis in an assessment of a firm's competitive environment."

In this Toolkit, we recommend using the Value Chain tool during the Screen stage, as shown in Figure 1, before entering the Design stage.

Figure 1: **The blue and orange arrows show the beginning and end of the tool (respectively) being used before entering the Design stage. Value chain analysis is critical in a concurrent engineering approach to design. It takes into account the ability of the organization or company to actually complete NPD, and to make, sell and support the product or service once it is launched.**

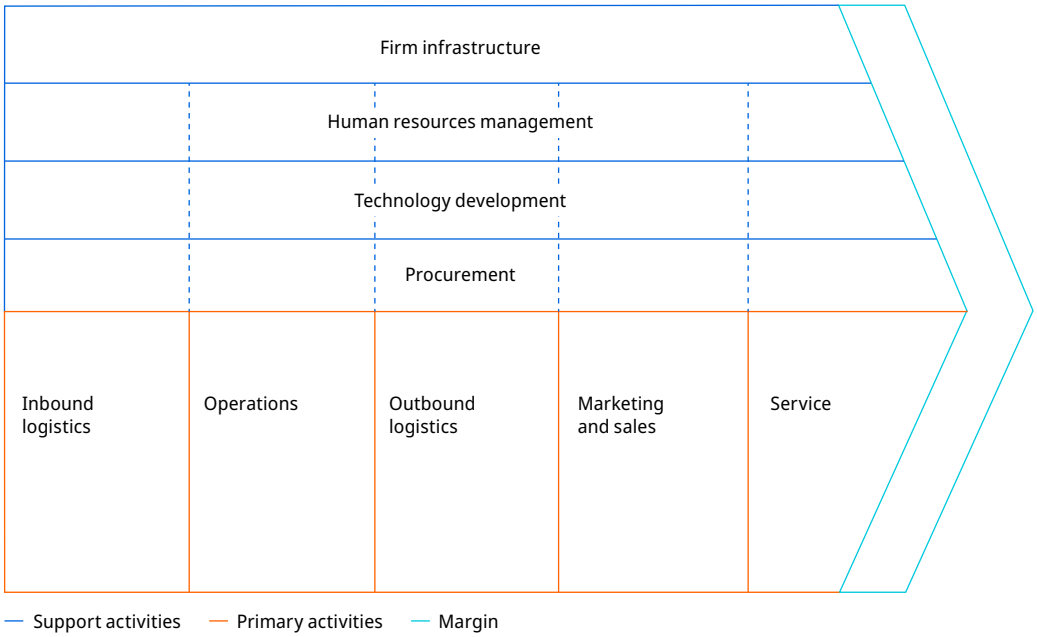


What is the value chain?

The value chain is a concept from Michael Porter and refers to the set of activities needed to get a product or service to market and then make money from it. It is called the value chain because, when done well, each activity in the chain creates value. The so-called **primary activities** are those needed to make, sell and support the product or service in the market. The **support activities** are those that enable the primary activities to be performed. The goal of value chain analysis is to make sure the product or service can be developed, made, sold and supported profitably. Each activity is examined to make sure the company, organization or agency has the capabilities and capacities to perform the activity effectively and efficiently. (An activity can be performed by an employee, a contractor, a consultant or an external partner.) Analyzing the value chain is critical for reducing execution risk.

The value chain shown in Figure 2 is reproduced from *Using Inventions in the Public Domain: A Guide for Inventors and Entrepreneurs* (2020).

Figure 2: Porter's generic value chain.



Source: Redrawn from Porter, Michael E. (1985) *Competitive Advantage: Creating and Sustaining Superior Performance.* The Free Press, a Division of Simon & Schuster, Inc.

Value chain analysis focuses on the primary activities in the value chain, which are categorized in this model as inbound logistics, operations, outbound logistics, marketing and sales, and service. Value chain analysis involves identifying levels of potential risk associated with each of these activities in the value chain. This analysis will require you to break down these activities in two ways, which will give you a detailed picture of the value chain for your NPD project.

- First, you break down an activity into the specific items that are required for that activity, such as all the essential components and human resources you will need to build a product as part of your inbound logistics and operations activities, or all the outputs you will generate as part of your outbound logistics, marketing and sales, and service activities.
- Second, you need to identify and list issues that are specific to each activity, which could have an impact on the items that are required for that activity. These issues can be a list of design requirements or specifications, or a list of production methods and facilities/equipment/human resources that will be needed, or a list of issues related to inventory, shipping and handling.

This two-factor analysis creates a matrix that facilitates identifying aspects of the value chain where risks may lie. You can evaluate each intersection and estimate the risk level for that cell. Then you can focus on how to reduce the risks identified.

Value chain analysis is an important tool for addressing execution risk, which refers to the ability of your organization or company to actually produce, sell and support the product or service. Execution risk can be reduced by identifying and trying to solve potential downstream problems early in the new product development (NPD) process by designing and making more easily produced, sold and supported goods. Value chain analysis provides one method for finding potential problems in the value chain, which provides an opportunity to address execution risk by trying to solve those problems.

Note that after you make this detailed analysis of each cell and its associated risks, you will be able to generate higher-level estimates of risk, such as an average estimated level of risk for each item required for an activity across all the issues listed, and an average estimated level of risk for the activity as a whole. These higher-level estimates have two uses. First, they allow you to prioritize your risk reduction activities for most impact. To illustrate this using the biofuels example, you might find a high level of risk associated with reliably procuring sensors with consistently high quality, but you might also find that you have a low risk related to procuring

consistently high-quality vats and piping. These results suggest that you should focus risk-reduction activities on the sensor problem before addressing the procurement of vats and piping. As another example, you might find that a single activity has consistently high estimated risk levels for every item you listed, which indicates that you may want to redesign that activity before proceeding with the NPD process.

The second use of higher-level risk estimates is when generating discount rates for net present values for a product or service. How to do that is discussed in Tool 15: Net Present Value.

How do you enter data in the Value Chain tool?

The Value Chain tool focuses on the primary activities in the value chain. The workbook uses a matrix-based approach to capture information and analyze each of these primary activities. It is easy to copy the blank tabs and adapt them if you also wish to enter data for support activities.

The Value Chain tool is based on an input–output model of flows though the primary activities; that is, what comes into a primary activity (e.g., parts and components being inventoried for later use in production) and what goes out (e.g., the final product and its add-ons). On each sheet you enter what is requested in the rows and columns, which is specified in the titles in white in the dark blue cells above the rows and columns. Inputs and outputs when entered on one spreadsheet are carried forward, as appropriate, to the next one. Sometimes, instead of a new input or output you are asked to enter concerns associated with an activity in the rows. The heading specifies what information should be entered.

In the intersections of the matrix, you will estimate the risk associated with the intersection of an input or output and the specified aspect of that activity of the value chain. The spreadsheet will then calculate the average risk for a row and for the activity. How to use these calculations is explained below.

The workbook is built around inputs to value chain activities, outputs from them, and risks that may occur when either obtaining inputs or creating outputs. Each tab is a specific value chain activity.

On each of the tabs, for that value chain activity you have the inputs (parts, components, subsystems, etc., on the first tab, “Inbound logistics”) that you need to conduct the activity. These items are entered in the far-left column (column A). When appropriate, the items in that column are carried forward to column A on the next tab, “Operations.” The kinds of items to be entered in row 3 are specified in the label in row 2 of that tab. Where row 3 consists of outputs, when those outputs are inputs to the next value chain activity, they appear in the far-left column on the next tab as inputs to that next value activity. Figures 3, 4 and 5 illustrate this by showing completed matrices from the “Inbound logistics,” “Operations” and “Outbound logistics” tabs of the Value Chain workbook using the biofuels example.

Figure 3: On the "Inbound logistics" tab of the Value Chain workbook, you enter parts, components, etc., in the far-left column (column A) and design requirements/specifications concerns in the third row, as shown in the workbook using the biofuels example.

Inbound logistics

Requirements / Risk (3 High, 2 Medium, 1 Low) / Parts, components, etc.	Average of risks	Design requirements/specifications concerns: Availability at affordable price	Efficiency/efficacy	Storage of inventory	Payment terms	Environmentally friendly	On-time delivery	Quality
Vats	1	1	1	1	1	1	1	1
Piping and valves	1	1	1	1	1	1	1	1
Sensors	2.1429	3	2	1	2	1	3	3
Organism	3	3	3	3	3	3	3	3
Mats for organism	2	2	2	2	2	2	2	2
Conveyers	1	1	1	1	1	1	1	1
Chippers/mulchers	1	1	1	1	1	1	1	1
Filters	1	1	1	1	1	1	1	1
Software for monitoring and maintenance	2	2	2	1	2	1	3	3
Telecommunications for data transmission and remote control	1.2857	1	1	1	2	1	2	1

Figure 4: "Operations" tab of the Value Chain workbook. Note how the items entered in the parts, components, etc., column on the first tab, "Inbound logistics," are automatically carried forward to the next tab, "Operations," as shown in the Value Chain workbook using the biofuels example.

Operations part 1

Risk (3 High, 2 Medium, 1 Low) / Parts, components, etc.	Average of risks	Production methods and facilities/equipment concerns: Spoilage/deterioration	Waste disposal	Labor availability at affordable price	Special fixtures or machinery	Energy consumption	Welding and other connections
Vats	1	1	1	1	1	1	1
Piping and valves	1	1	1	1	1	1	1
Sensors	1.5	1	2	2	1	1	2
Organism	2.33333	3	3	2	3	2	1
Mats for organism	1	1	1	1	1	1	1
Conveyers	1.16667	1	1	2	1	1	1
Chippers/mulchers	1.33333	2	2	1	1	1	1
Filters	1.33333	2	1	1	2	1	1
Software for monitoring and maintenance	1.16667	1	1	2	1	1	1
Telecommunications for data transmission and remote control	1.16667	1	1	2	1	1	1

Operations part 2

Risk (3 High, 2 Medium, 1 Low) / Parts, components, etc.	Average of risks	Outputs/product systems/major components: Mini-refinery hardware	Sensor system	Operations and maintenance module	Organism kit	Regulatory approvals and certification	User and remote operation manuals
Vats	1	1	1	1	1	1	1
Piping and valves	1.5	3	1	2	1	1	1
Sensors	2	2	2	2	3	1	2
Organism	2.33333	2	2	2	3	3	2
Mats for organism	2	1	2	2	3	2	2
Conveyers	1.16667	1	1	2	1	1	1
Chippers/mulchers	1.16667	1	1	2	1	1	1
Filters	1.33333	1	1	2	1	1	2
Software for monitoring and maintenance	2.16667	2	2	2	3	2	2
Telecommunications for data transmission and remote control	1.66667	1	2	2	1	2	2

Figure 5: On the "Outbound logistics" tab of the Value Chain workbook, the outputs/product systems/major components from the right-hand table on the "Operations" tab have been carried forward as shown in the workbook using the biofuels example. These outputs/product systems/major components are then carried forward to the next two tabs – "Marketing and sales" and "Service and support."

Outbound logistics

Outputs/ product systems/ major components	Average of risks	Inventory, shipping, handling, etc. concerns			
		Inventorying	Affordable transport options	Packing material and methods	Late delivery
Mini-refinery hardware	1.5	1	1	2	2
Sensor system	2	2	3	1	2
Operations and maintenance module	1.25	1	1	1	2
Organism kit	2.75	2	3	3	3
Regulatory approvals and certification	1	1	1	1	1
User and remote operation manuals	1	1	1	1	1

Unfortunately, there is no way to pre-determine the risk for any cell. Risk is the fear of failure, so what you are estimating is how large the risk of failure is for that specific aspect of the value chain. The best advice we can give is to ask the people responsible for performing the activity. These could include employees of the company or organization conducting NPD; vendors or subcontractors; consultants; or partnering organizations.

Describe the product you are planning on developing. Give them information on the design parameters. Ask them how confident they are, in light of the information you have provided, that they can do the activities in the value chain you expect them to without any problems. Ask them to be honest with you about any concerns, and capture these in the columns of the relevant activity spreadsheet. Sometimes you will be asking for concerns associated with the process and methods for conducting the activity. Other times you will be asking for concerns associated with obtaining an input or producing an output. Again, each activity's tab in the workbook guides you on the data to seek; this is specified in the white titles on a dark blue background for the rows and columns.

The less confident the people you talk with are, the higher the risk associated with that item. Be sure to make clear that there is no right or wrong answer. What you need is realistic assessments so that, as you design the product or service during the next stage of NPD, you can do it in a way that makes it possible for them to be successful at what they do. Once you have captured their concerns, ask them to estimate the level of concern they have (that is, their perception of the risk). The rankings go from 1 (low risk) to 3 (high risk). Capture these in the intersection cells. The spreadsheet will automatically generate an estimated average risk for that row.

You may wish to improve your estimates by seeking the advice of outside consultants who are experts in the relevant activities for your kind of product or service and who have good knowledge concerning best practices, before speaking with in-house people. Ask these outside consultants to set the risk rankings for you based on using best practices and to provide an explanation that includes a description of these best practices. These rankings and the explanations can be offered as a "strawman" to the people responsible for performing the activity. A strawman is a draft prepared solely to provide a starting point for discussions. The reason for doing this is that people often find it easier to make estimates if they are reacting to a strawman when confronted by a new product or service they have not dealt with before.

To illustrate this, look at the results of conversations with the people responsible for the activity of inbound logistics. The results of these hypothetical conversations have been captured on the "Inbound logistics" tab of the biofuels example workbook. The rows are the items (parts, components, etc.) to be procured and inventoried. The columns reflect design requirements or specifications for the product or service being produced. We have also captured hypothetical estimates of risk in the intersection cells. For the part identified as "Vats" in row 4 on that tab, an estimated level of risk was entered for each of the following aspects of inbound logistics: "Vats – Availability at affordable price" (cell C4); "Vats – Efficiency/efficacy" (cell D4); "Vats – Storage of inventory" (cell E4); "Vats – Payment terms" (cell F4); "Vats – Environmentally friendly" (cell G4); "Vats – On-time delivery" (cell H4); and "Vats – Quality" (cell I4). An embedded formula calculated the average risk level for inbound logistics involved with the vats that are needed for building mini-refineries (cell B4). At the bottom of column B, an embedded formula calculates the average risk for all of the listed inbound logistics activities in the value chain for this product, based on the average estimated risk for each item in column A. The results show that logistics involved with acquiring the vats has a low estimated risk level (cell B4). In contrast, the logistics involved with acquiring sensors for the mini-refineries (see row 6) have a high average level of risk (cell B6), with the highest risk levels associated with availability at an affordable price (cell C6), on-time delivery (cell H6) and quality (cell I6), and low risk associated with storage of inventory (cell E6) and being environmentally friendly (cell G6).

The most accurate risk estimates will come from the people who work in and manage that part of the value chain, so ask them to set the rankings for you. If they find it difficult to make estimates of risk, offer them a strawman. In this approach, using your best guesses as to the riskiness, you complete a tab to make the strawman. Then you show that strawman to the people responsible for completing that part of the value chain and ask them to modify the rankings as they see fit and explain their reasoning to you.

Now that you have your risk rankings, begin with the activities with the highest risk. Within those, go to the items (the columns) with the highest risk. Ask the people responsible for the activity to help you disaggregate their rankings into two dimensions: how significant for their activity the risk is, and how likely it is to occur. Next, use the table in Figure 6 to help you determine how to address the risk.

Figure 6: **Risk ranking and how to address the risks after examining their significance and likelihood of occurrence.**

Likelihood of occurrence:	High	Low
Significance: High	**Avoid**	**Mitigate** (contingency plans and control consequences)
Significance: Low	**Mitigate** (contingency plans and control consequences)	**Accept** (carry on, unless you have the time and resources to mitigate)

Where the table says "Avoid" because a risk is significant and likely to occur, this probably means you will have to reconsider that design requirement for the product or service. Where the table says "Mitigate," in consultation with the people responsible for performing the activity, first determine if you can adopt a new way of performing the relevant tasking (a best practice) in order to mitigate or avoid it. If not, consider other mitigation strategies with the people responsible – including redesigning or changing the requirements for the product or service. If you cannot, ask yourself whether this a risk you are willing to bear. Depending on the time you want to spend on risk reduction, address the low risks last. Your risk solutions should be entered on the "Solutions" tab of the workbook (see Figure 8).

To make your strawman, examine your action plan (see Figure 7). Ask yourself the following question: If this action plan is successfully executed [this would be a so-called support activity under "Technology development" in the upper portion of Porter's generic value chain model shown in Figure 2], how confident are you that the various primary activities you enter on the tabs of the Value Chain workbook can be successfully completed? If you are very confident, that means there is little risk, so you would enter 1. If you are not confident at all, that means high risk, so you would enter 3. If you are not sure, do you lean more toward confident (1) or not confident (3). When making estimates with little certainty, just use a binary ranking scale of 1 or 3.

Figure 7: **Your action plan can be used as a starting point to estimate the riskiness of your value chain, as shown here by the Action Plan workbook using the biofuels example.**

Steps involved and percentage of anticipated progress toward completion								
Tangible features OR design requirements	Idea	Screen	Design	Development	Test	Launch	Post-launch	Totals
Cutting and mulching waste equipment	5%	20%	20%	50%	5%	0%	0%	100%
Brewing vats and capture tanks	5%	20%	35%	25%	15%	0%	0%	100%
Cleanable filters	5%	20%	20%	40%	15%	0%	0%	100%
Piping and valves	5%	20%	35%	25%	15%	0%	0%	100%
Conveyors	5%	20%	20%	40%	15%	0%	0%	100%
Fungi/organisms for biodiesel, ethanol, and hydrogen	5%	25%	25%	25%	20%	0%	0%	100%
Controls for onsite and remote operations, monitoring, and preventative maintenance	5%	25%	25%	25%	20%	0%	0%	100%
Sensors for onsite and remote operations, monitoring, and preventative maintenance	5%	20%	25%	25%	20%	0%	5%	100%
Software for onsite and remote sensors and controls for operations, monitoring, and preventative maintenance	5%	25%	25%	25%	20%	0%	0%	100%
Modularize for transport	5%	15%	35%	30%	10%	0%	5%	100%
Should-cost price	5%	15%	40%	20%	10%	5%	5%	100%

How it will be accomplished and how you will know it is done					
Stage	Key tasking	Who is responsible for completion	Completion milestone	Budget	Start and end dates
Idea	"Determine the feasibility of sourcing necessary organisms, parts, components, and systems."		Validation that suitable organisms exist and can function in the mini-refinery.	USD 5,000	02/02/2021 - 20/02/2021
Screen	Assess market, technical, and financial viability.	Market work: market research expert; technical viability: engineering expert and legal consultant; financial: finance and budgeting expert	Competitive advantage and freedom to operate established; confirmed feasibility of market entry for the product concept; Technology Readiness Level (TRL) 2 achieved.	USD 25,000	01/03/2021 - 25/05/2021
Design	Establish a Business Model Canvas; finalize the technical approach, secure organism licenses, and establish proof of concept; complete the design project in alignment with the model.	Business model canvas: team leader; technical approach and design: engineering and technical expert, and design consultant; IP and supplier/vendor qualification and contracting: logistics expert, with legal consultant	Business canvas model approved; licenses for organisms obtained; TRL 3 achieved; design approved; vendors/suppliers qualified and contracts in place	USD 100,000	01/07/2021 - 30/11/2021
Development	Develop a benchtop prototype and an operational prototype; raise the remaining necessary funding.	Engineering and technical expert, with production engineering consultant	TRLs 4, 5, 6, and 7 attained	USD 170,000 through TRL 4. Additional USD 1.3 million as raised	01/12/2022 - 28/10/2022
Test	Achieve all certifications and regulatory compliance; complete beta testing.	Engineering and technical expert and logistics expert, with legal consultant	TRL 8 and 9 attained; all necessary certifications and registrations received	USD 500,000	01/11/2022 - 28/03/2023
Launch	Prepare manuals and train market and sales personnel, sales representatives, installers, and maintenance repair staff; implement a marketing campaign; establish corporate and retail sales channels.	Training: team leader with training consultant; marketing and sales: business development expert and sales and marketing department manager	Personnel trained for launch and support; marketing campaign implemented; sales channels established; initial revenue targets hit	USD 200,000	01/04/2023 - 28/08/2023
Post-launch	Revise manuals and training materials as needed; enhance online training and support with improved software and platforms, if available and affordable; develop a list of desirable improvements, enhancements, and additions.	Product line manager. Team now acts as in-house consultants	Removal of product from sales plans	To be provided by product line manager as needed	15/01/2024 - 30/12/2043

Note that each tab will give you an average risk for each row, and for the table, and in some cases for the entire tab. We recommend developing mitigation strategies for the higher risks first, beginning with the tab with the highest risk. For each average risk value of 2 or 3, develop a risk avoidance or mitigation solution. To do this, consult with the people who are responsible for the activity. If appropriate or necessary, seek outside support from consultants, vendors, partners or other experts.

The solutions for risks are recorded on the "Solutions" tab. List the risks you identified and record the solutions you developed on the spreadsheet, as shown in Figure 8 using the biofuels example workbook. On the "Solutions" tab you are asked to estimate both the feasibility and the anticipated effectiveness of each solution. Obviously, where either or both of these seem low, the solution should only be adopted if nothing else can be proposed or thought of.

Figure 8: **An extract from the "Solutions" tab of the Value Chain workbook using the biofuels example.**

Solutions to risks

Risk to be addressed	Who is responsible	What will be done	Feasibility (0–100%)	Anticipated effectiveness (0–100%)
Organism selection, their health and replacement throughout the product's life, and support for consumable sales	Technical expert, supported by a logistics expert, for licensing or contract research where applicable	Hire competent consultants or obtain know-how from the licensor on how to grow and maintain cultures, ship them, etc. Additionally, hire and train up to three master's-level microbiologists to handle operations, support sales of consumables, and address customer issues. Ship organism kits directly from us to the user. Develop a backup plan in case suitable organisms cannot be licensed, to ensure the project does not have to be canceled.	100%	90%
Sensor suite selection, placement, repairs, and upgrades	Technical expert, with support from a marketing expert and a service expert, regarding their needs	Establish a long-term relationship with a competent integration vendor; develop a suite with a drop-in replacement approach. Hire one engineer in-house to manage sensor vendors and support operations and service.	100%	100%
Vendor qualification	Logistics expert	Develop a vendor qualification program. Benchmark against a successful company in our industry from another country that is recognized as a leader in best practices.	100%	100%
Software for operations and maintenance, and sensor monitoring	Technical expert	Find a commercial off-the-shelf package and have the vendor adapt it. Identify a vendor for secure storage and downloads upon our approval. Prepare a decision tree to guide service, and train our sales and service team to use it.	85%	90%
Service	Technical expert, supported by a marketing expert	Develop a three-person repair team with a strong understanding of all components, parts, and systems to support service organizations and implement relevant upgrades. Establish a small in-house service operation with two employees who are able to travel to customer sites as needed. Ensure they are sufficiently proficient in software to conduct remote operations and maintenance.	90%	90%
Sales	Marketing expert, supported by a logistics expert	Determine the best structure for running sales and marketing, and present your recommendation to the team.	80%	90%
Training	Marketing expert, supported by a technical expert	Develop an outline for the required training. Hire a vendor to prepare the training materials and teach our sales engineers how to conduct the training. Integrate the training with decision trees for hardware, sensors, software, and organism kits.	80%	80%
Production	Production manager, with support from a technical expert	Develop an integrated production model and perform value engineering on it. In partnership with a technical expert, create decision trees for all parts, systems, and components to be used when addressing problems either in production or in the operation of a unit, whether by customers or remotely by our staff.	100%	90%

After developing your solutions, go back and redo the risk rankings. Iterate the process until you feel the riskiness of the value chain is acceptable.

How do you interpret the data in the Value Chain tool and use it in your NPD process?

The purpose of the Value Chain tool is to ensure that you have the capabilities and capacities to successfully make, sell and support the product or service you are designing and developing. Where there is risk, the likelihood of success decreases. How much risk you are willing to bear will vary by entity, but each company, institution or agency has a risk threshold. This tool helps you to see what and where your risks are, think about how much risk you can bear, and decide whether you have exceeded your risk threshold.

After completing the Value Chain tool, go back and review your action plan.

Figure 9: Your action plan should be reviewed after examining the riskiness of your value chain and developing ways of reducing risk. Shown here is a part of the Action Plan workbook using the biofuels example.

Steps involved and percentage of anticipated progress toward completion								
Tangible features OR design requirements	Idea	Screen	Design	Development	Test	Launch	Post-launch	Totals
Cutting and mulching waste equipment	5%	20%	20%	50%	5%	0%	0%	100%
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Cleanable filters	5%	20%	20%	40%	15%	0%	0%	100%
Piping and valves	5%	20%	35%	25%	15%	0%	0%	100%
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Controls for onsite and remote operations, monitoring, and preventative maintenance	5%	25%	25%	25%	20%	0%	0%	100%
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Modularize for transport	5%	15%	35%	30%	10%	0%	5%	100%
Should-cost price	5%	15%	40%	20%	10%	5%	5%	100%

How it will be accomplished and how you will know it is done					
Stage	Key tasking	Who is responsible for completion	Completion milestone	Budget	Start and end dates
Idea	"Determine the feasibility of sourcing necessary organisms, parts, components, and systems."		Validation that suitable organisms exist and can function in the mini-refinery.	USD 5,000	02/02/2021 - 20/02/2021
Screen	Assess market, technical, and financial viability.	Market work: market research expert; technical viability: engineering expert and legal consultant; financial: finance and budgeting expert	Competitive advantage and freedom to operate established; confirmed feasibility of market entry for the product concept; Technology Readiness Level (TRL) 2 achieved.	USD 25,000	01/03/2021 - 25/05/2021
Design	Establish a Business Model Canvas; finalize the technical approach, secure organism licenses, and establish proof of concept; complete the design project in alignment with the model.	Business model canvas: team leader; technical approach and design: engineering and technical expert, and design consultant; IP and supplier/vendor qualification and contracting: logistics expert, with legal consultant	Business canvas model approved; licenses for organisms obtained; TRL 3 achieved; design approved; vendors/suppliers qualified and contracts in place	USD 100,000	01/07/2021 - 30/11/2021
Development	Develop a benchtop prototype and an operational prototype; raise the remaining necessary funding.	Engineering and technical expert, with production engineering consultant	TRLs 4, 5, 6, and 7 attained	USD 170,000 through TRL 4. Additional USD 1.3 million as raised	01/12/2022 - 28/10/2022
Test	Achieve all certifications and regulatory compliance; complete beta testing.	Engineering and technical expert and logistics expert, with legal consultant	TRL 8 and 9 attained; all necessary certifications and registrations received	USD 500,000	01/11/2022 - 28/03/2023
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Post-launch	Revise manuals and training materials as needed; enhance online training and support with improved software and platforms, if available and affordable; develop a list of desirable improvements, enhancements, and additions.	Product line manager. Team now acts as in-house consultants	Removal of product from sales plans	To be provided by product line manager as needed	15/01/2024 - 30/12/2043

Ask yourself the following question: What revisions should I make to the action plan based on the value chain analysis? Once you have made these revisions, ask yourself: Can this action plan likely be successfully executed? If the answer is no, there is a problem. It means the NPD project has an unacceptable level of risk. It is then a management decision whether to bear that risk and proceed, or to terminate the NPD project.

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