

RISKS IN LAUNCHING A NEW FOOD PRODUCT



**CONSUMER PACKAGED
GOODS**

Risk Management
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Risk Analysis

Introduction

The Consumer Packaged Goods (CPG) industry is worth an exorbitant amount of money worldwide, with an estimated value of \$635 billion in the United States. Here, the focus of the risk analysis conducted will be on processed foods and beverages, a subcategory of the CPG industry. Within this subcategory, there exist the brands we all know and have to come to love, as well as new entrants vying for market share. As with other for profit endeavors, CPG companies have financial targets they must hit, including those for new products.

The Stage Gate process is used when bringing a new food product to market from discovery/ideation to product launch/project closure, which typically takes twelve months. Risk management is a continual, iterative part of the process – beginning at project inception, with drafting of the project charter, until completion at project closeout. The risk analysis completed for this project outlines the events, sources, and objectives of bringing a new food product to market. The project team completed the risk assessment using Riskion software to measure and synthesize data in order to make recommendations regarding how to mitigate risks and optimize controls.

Stage Gate Process



Project Structure

This project analysis was modeled using Riskion software (Comparion used interchangeably). The analysis that follows outlines the components of the completed risk assessment, along with visual aids, and expounds on some elements. Using the results of the software, the team was able to make decisions to reduce the risk of launching a new food product in the CPG industry, while still remaining profitable.

Identifying Risk Events

The project team brainstormed and identified risk events, that if realized, would result in loss to a CPG company bringing a new food product to market. For example, there is a risk of labor issues at the production facility. As reported by McKinsey & Company, the supply of staff available to fill manufacturing labor positions is dwindling. In fact, in 2017, available jobs outnumbered unemployed personnel at a ratio of eight to one.

The project team identified fifteen events, which were inputted into the Comparion software as listed below:

Unique ID		Events 
[01]		Miss the Customer Ship Date
[02]		Product doesn't sell
[03]		Product Recall
[04]		The consumer not able to understand and reap the benefits of the product
[05]		Competition Comes out with product first
[06]		Competition Comes out with a cheaper product
[07]		The product short ships due to high demand, not enough pre-build of the product
[08]		Raw ingredients are not available to produce the product
[10]		Lack of project team member availability
[11]		Labor issues at the production facility
[12]		Tariffs on exporting products
[13]		FDA regulation changes
[14]		Sales team not appropriately trained to sell the product
[15]		Stakeholders fail to support project

Figure 1: Risk Events

Identifying Risk Sources

The project team identified three categorical sources of risk events, including the Human Factor, Environmental sources, and scope. An examination of human factors as a risk source circles back to the risk event of labor issues. As mentioned previously, the supply in the labor force does not meet demand. This shortage is also coupled with high turnover. In fact, the turnover rate in the food and beverage sector of manufacturing jobs average 41.5%. Such a high turnover rate requires additional resources and time for training, and makes it difficult to consistently maintain high levels of quality and production. (McKinsey). Then, within each category, the sources were further decomposed, as shown in *Figure 2* below:



Figure 2: Risk Sources

Identifying Objectives

The project team members met with the CPG company’s executives, which included the CEO, Jane Sellall, and the CFO, John Money. Together, they identified the company’s topmost five categorical objectives, including 1) financial; 2) safety; 3) customer experience; 4) public relations; and 5) environmental concerns. These are also presented hierarchically below:



Figure 3: Objectives

Participant & Roles

Participants were selected based on their position within the organization and their ability to speak to the different aspects of the risk analyses, such as identification of risk events, sources, company objectives, controls, and optimization of controls. As shown below, there were two actively involved project managers assigned, Sarah Beltz and Tammie Williams. In addition, the CEO, Jane Sellall, and the CFO, John Money provided input.

Email Address	Participant Name	Permission	Has Data?	Disabled?	Action
tdwilliams@gwu.edu	Tammie Williams	Project Manager	Yes	<input type="checkbox"/>	  
cfo@gwu.edu	John Money, CFO	Evaluator	Yes	<input type="checkbox"/>	  
ceo@gwu.edu	Jane Sellall, CEO	Evaluator	Yes	<input type="checkbox"/>	  
sbeltz1@gwu.edu	Sarah Beltz	Project Manager	Yes	<input type="checkbox"/>	  

Figure 4: Participants & Roles

Below is an example of a participant’s role for sources:

Participants Groups

	Participant Name
<input type="checkbox"/>	Jane Sellall, CEO
<input checked="" type="checkbox"/>	John Money, CFO
<input type="checkbox"/>	Nicholas Stavrakakis
<input type="checkbox"/>	Professor Forman
<input type="checkbox"/>	Sarah Beltz
<input type="checkbox"/>	Tammie Williams

- [-] Sources
 - [-] Human Factor
 - Changes in the Union Agreement*
 - Not following policy, documented process, or safety regulations*
 - Workforce not trained properly*
 - Changes in consumer tastes*
 - Selection of less appealing packaging and design*
 - Change in strategic direction/vision*
 - [-] Environmental
 - Raw ingredients unavailable*
 - Price volatility*
 - Trade restrictions*
 - Multitude of point of sale options - online, etc. leads to less sales in brick & mortar stores*
 - [-] Scope
 - Project Scope Poorly Defined*
 - Scope continually changes*

Figure 5: Sample of Participant, John Money’s Role for Judging Sources

Likelihood & Impact of Events

Likelihood of Events

After identification of events, the likelihood of occurrence was plotted on a grid. An event may trace back to one or multiple sources. Likelihood estimates come from logic, historical data and

judgements. If there is no historical data, human experts may be used to because of their background or experience.

Events	Sources											
	Human Factor						Environmental				Scope	
	Changes in the UI	Not following policy	Workforce not trained	Changes in consumer	Selection of less effective	Change in strategy	Raw ingredients quality	Price volatility	Trade restrictions	Multitude of points	Project Scope Position	Scope continually
<input type="checkbox"/> Miss the Customer Ship I	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
<input type="checkbox"/> Product doesn't sell	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> Product Recall	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> The consumer not able to	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> Competition Comes out v	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
<input type="checkbox"/> Competition Comes out v	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
<input type="checkbox"/> The product short ships d	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> Raw ingredients are not c	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>					
<input type="checkbox"/> Lack of project team men	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> Labor issues at the produ	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> Tariffs on exporting produ	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>						
<input type="checkbox"/> FDA regulation changes	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
<input type="checkbox"/> Sales team not appropria	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
<input type="checkbox"/> Stakeholders fail to supp	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>				

Figure 6: Vulnerabilities Grid

Event Impacts

After plotting the likelihood of events, the project team similarly plotted the impact of the occurrence of events on company objectives. Identifying the impact to objectives provides perspectives for executives and project managers when selecting controls designed to mitigate or eradicate risk events.

Events	Objectives/Consequences									
	Financial			Safety		Customer Experience			Public Relations	Environmental
	Losing Customers	Losing Market Share	Shareholder Expectations	A safe work environment	Producing a product	The Customer has	The Customer has	Improving the Net	Reputation	Making choices to
<input type="checkbox"/> Miss the Customer Ship I	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> Product doesn't sell	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> Product Recall	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> The consumer not able to	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> Competition Comes out v	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> Competition Comes out v	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> The product short ships d	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> Raw ingredients are not c	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> Lack of project team men	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> Labor issues at the produ	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> Tariffs on exporting produ	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> FDA regulation changes	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> Sales team not appropria	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> Stakeholders fail to supp	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

Figure 7: Consequences Grid

Measurement Methods

Utilizing the Riskion software, the project team and the company’s executives entered their judgments for the likelihood of events, as well as for the impact of events. Application of the Analytic Hierarchy Process (AHP) was used when making judgments. Use of AHP allows for a comprehensive, scientifically valid weighing of all factors. The evaluators performed the risk assessments using methods such as rating scales, which allow for absolute measurements, and pairwise comparisons, which are relative measurements. Examples of rating scale measurements used for the likelihood of events given sources are provided below:

Measure Event Likelihoods	Measurement Type Default: Rating Scale	Measurement Scale or Given Likelihood	Action
Sources			
Human Factor			
Changes in the Union Agreement	Direct		Copy
Not following policy, documented process	Rating Scale	Default Likelihood Scale	Copy Edit
Workforce not trained properly	Rating Scale	Default Likelihood Scale	Copy Edit
Changes in consumer tastes	Rating Scale	Default Likelihood Scale	Copy Edit
Selection of less appealing packaging and design	Rating Scale	Default Likelihood Scale	Copy Edit
Change in strategic direction/vision	Rating Scale	Default Likelihood Scale	Copy Edit
Environmental			
Raw ingredients unavailable	Rating Scale	MID LIKELIHOOD RATING SCALE	Copy Edit
Price volatility	Rating Scale	MID LIKELIHOOD RATING SCALE	Copy Edit
Trade restrictions	Rating Scale	MID LIKELIHOOD RATING SCALE	Copy Edit
Multitude of point of sale options - online	Rating Scale	MID LIKELIHOOD RATING SCALE	Copy Edit
Scope			
Project Scope Poorly Defined	Rating Scale	WIDE LIKELIHOOD RATING SCALE	Copy Edit
Scope continually changes	Rating Scale	WIDE LIKELIHOOD RATING SCALE	Copy Edit

Figure 8: Measurement of Events Given Source Rating Scales

Once the types of measurement were determined, a survey was sent to all of the key stakeholder participants (Jane Sellall, CEO; John Money, CFO; Sarah Beltz, Project Manager and Tammie Williams, Project Manager). They applied their judgements based on their experience, known historic data, and previously defined company strategies. It is important that the participants use judgements to make statistically sound risk evaluations because Pairwise comparisons allow the evaluator to make a judgement on two components relative to each other, as in the example below. Here, the evaluator rated two financial objectives – losing customers versus losing market share, to determine the importance of the objective. The expert judgment of the evaluators is needed to capture the importance of objectives and to translate the data into priorities for non-linear relationships.

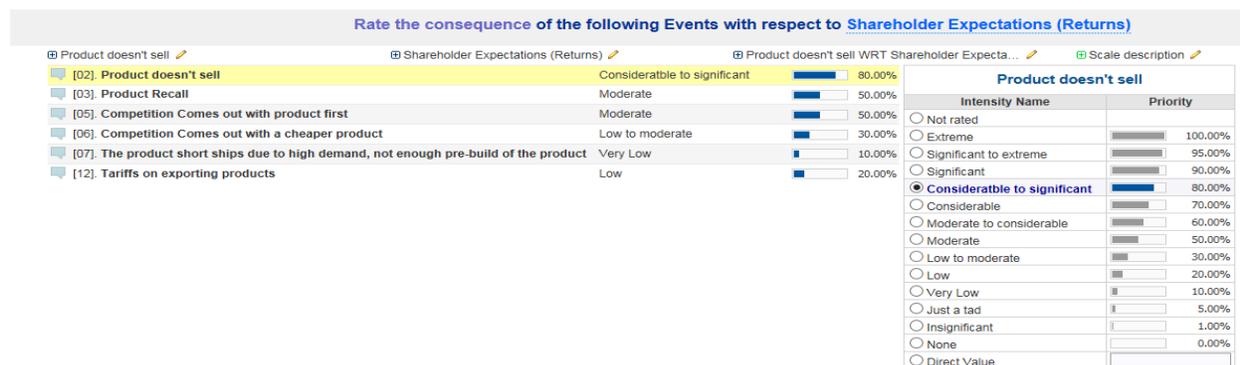


Figure 9: Rating Scale for consequences of events

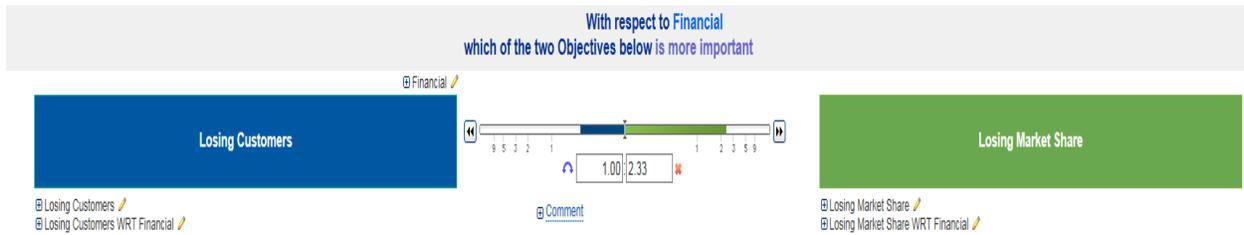


Figure 10: Pairwise comparison of objectives

Synthesized Project Results

Calculation of the likelihood and impact of specified events was computed in Riskion in order to synthesize project results. The likelihoods were then presented in charts broken down by percentages.

Synthesis of the Likelihood of Events & Sources

The likelihood of three categories of sources is identified by three different colors. Orange bars represent the Human Factor category, red bars represent sources in the scope category, and purple bar represent sources in the environmental category. The largest source of likelihood is *Multitude of Point of Sale Options Leads to Less Brick and Mortar Sales* at 68.95%, followed by *Project Scope Poorly Defined* at 36.28%. *Change in Strategic Direction* is the last source with a likelihood of only 5.5%.

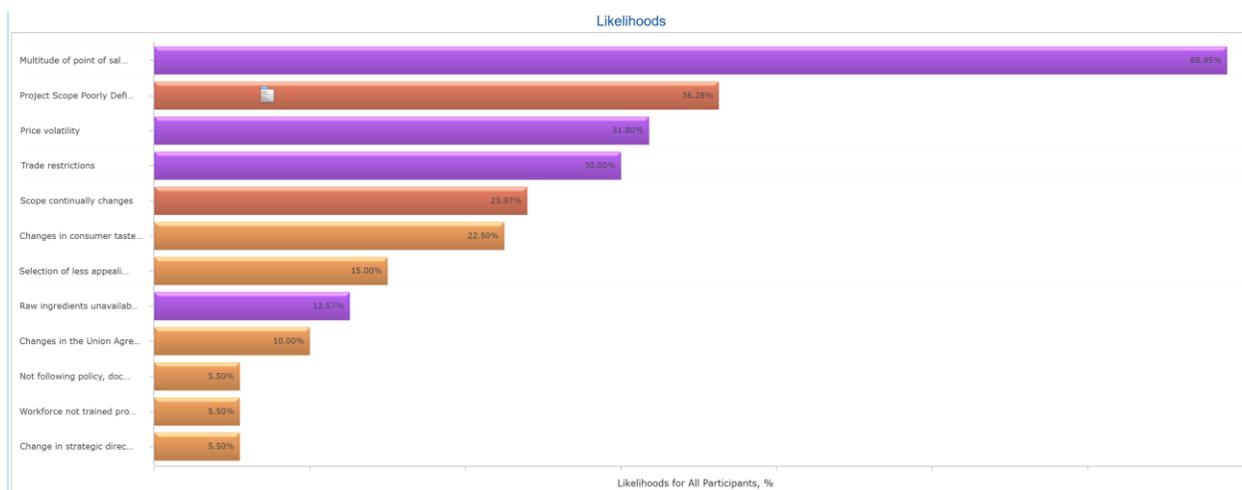


Figure 11: Source Likelihoods

After completion of the evaluations, the likelihood of events due to sources was also captured. The results were ranked as follows: the *Product Not Selling* was identified as the top risk at 73.96%; the next highest risk was *Missing the Customer Ship Date* at 55.91%, closely followed by *Competition Comes out with a Cheaper Product* at 55.84%. Finally, the risk identified as least likely due to sources was *FDA Regulation Changes* at 0.08%.

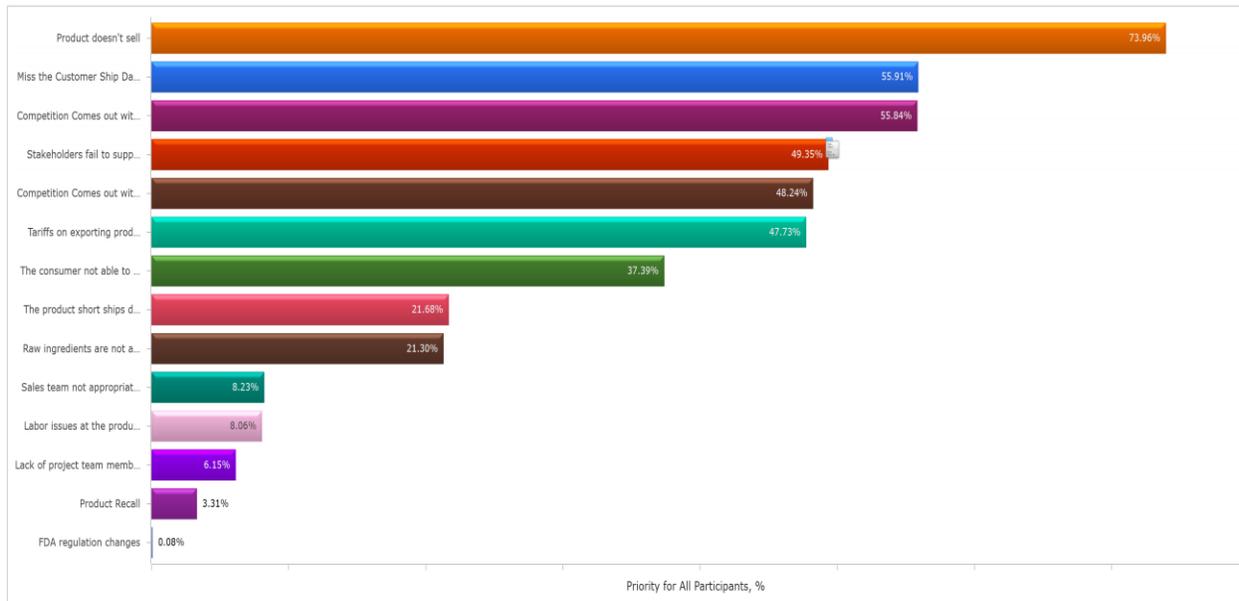


Figure 12: Likelihood of Events due to Sources

Synthesis of Impact of Events and Objectives

The impact of events was evaluated by the CEO, CFO, and the two previously named project managers. The category representing the top impact was *Product Recall* at 10.16%. The second highest impact was the *Product Doesn't Sell* at 7.03%. The calculated impact of events is provided below:

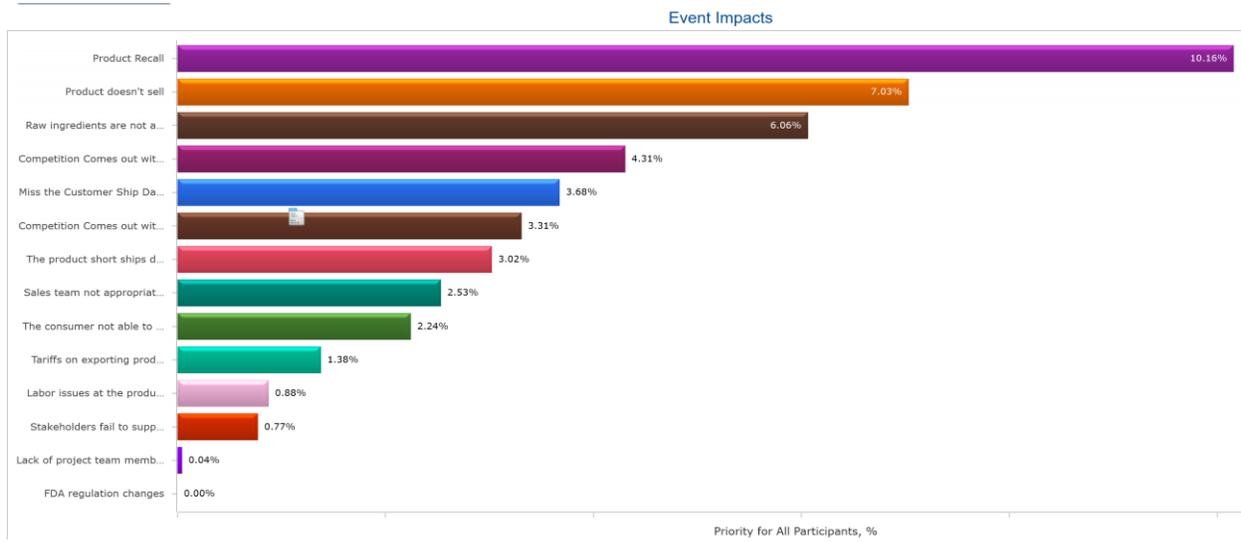


Figure 13: Impact of Events

In addition, the overall impact of events on objectives, as measured by all participants, was evaluated. The following Figures provide the global priorities (Figure 14), global priorities, including subcategories (Figure 15), the dynamic sensitivity of the events and objectives impacts (Figure 16), and the performance sensitivity of the objectives (Figure 17).

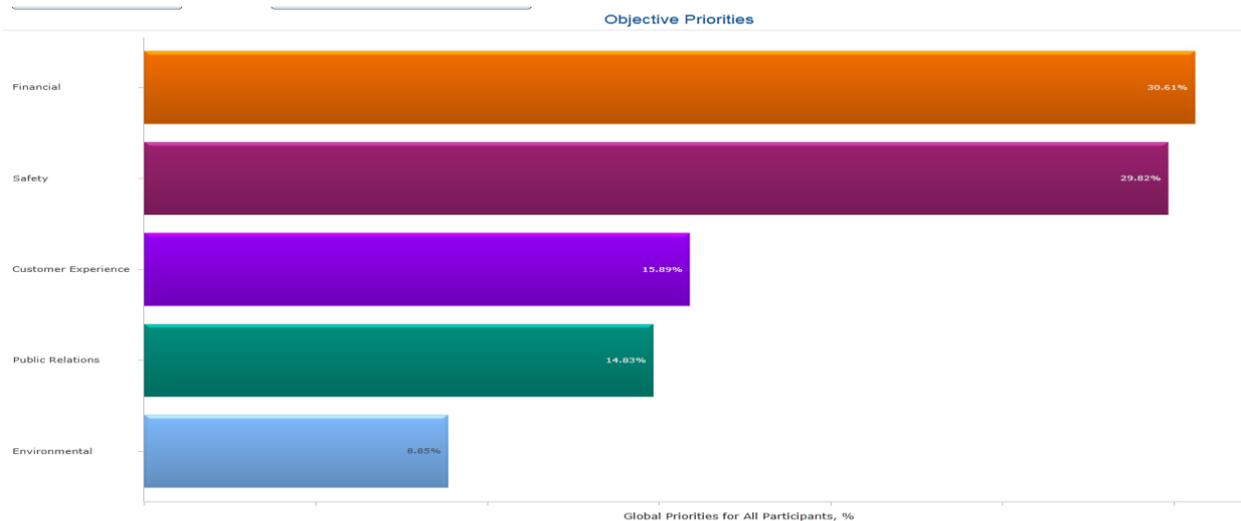


Figure 14: Objectives Priorities

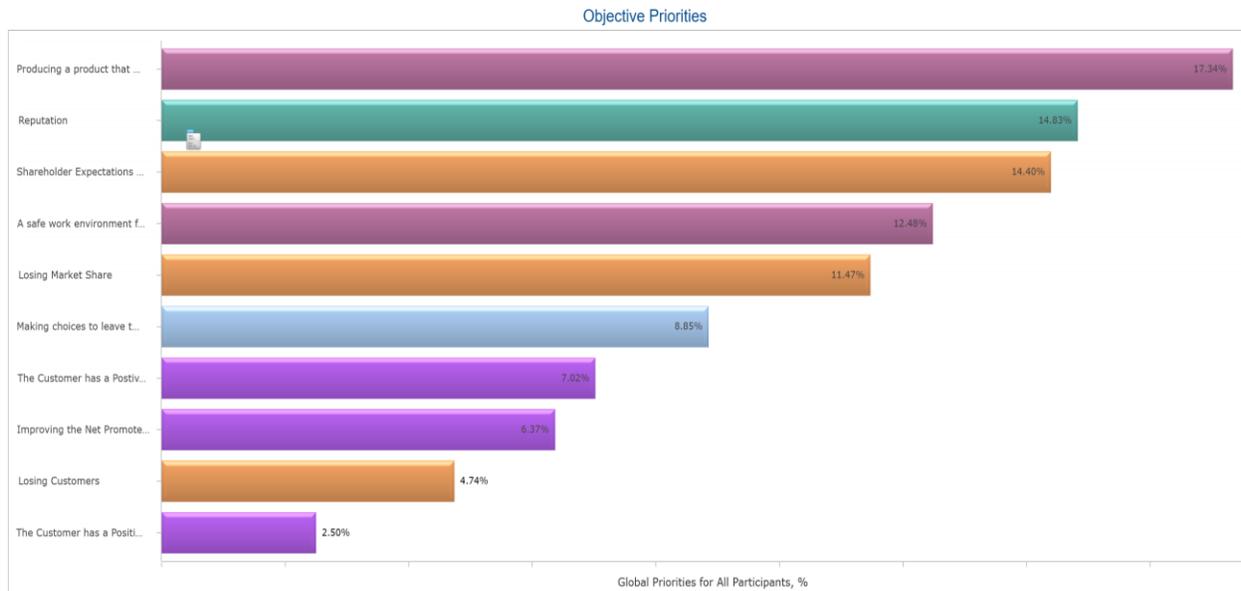


Figure 15: Objectives Priorities – including subcategories

The subcategories that were the top objective priorities were *Producing a Product that is Safe for the Public to Use (No foreign material)* 17.34% and *Reputation* 14.83%.

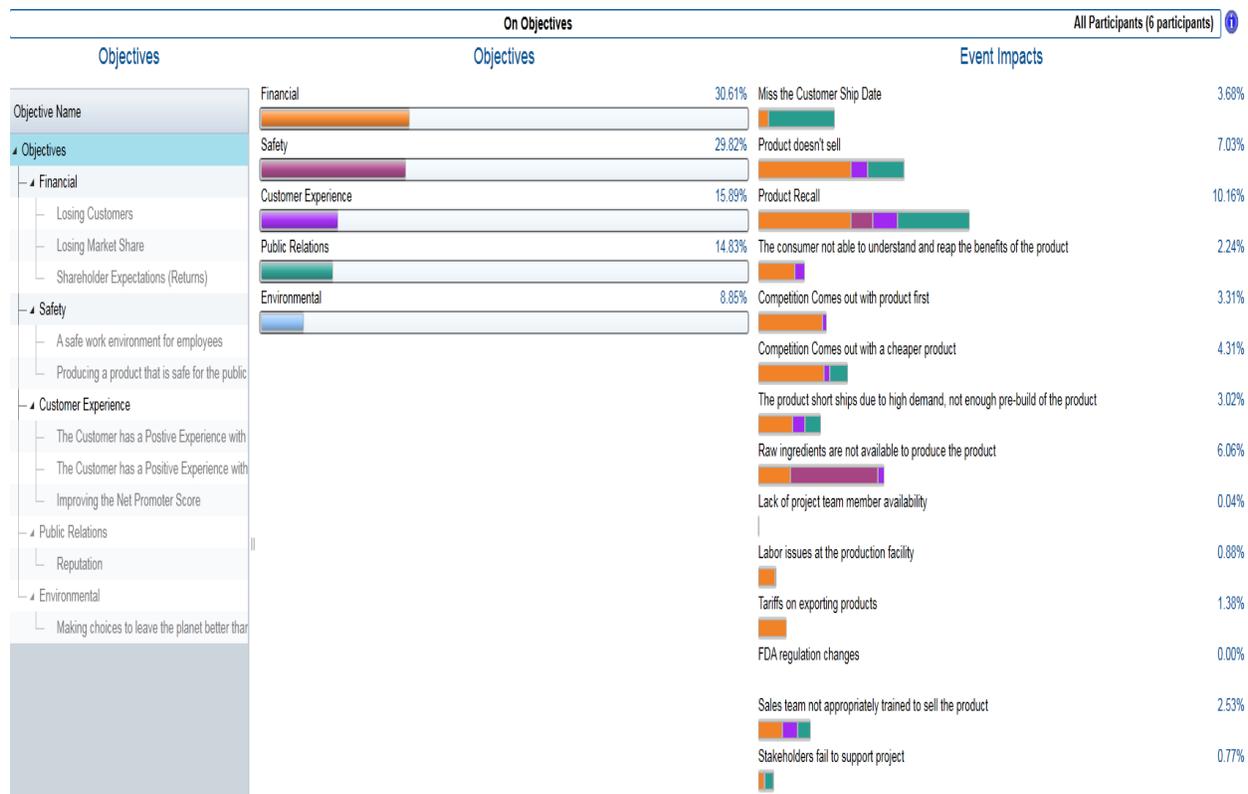


Figure 16: Sensitivity of Objectives - Dynamic

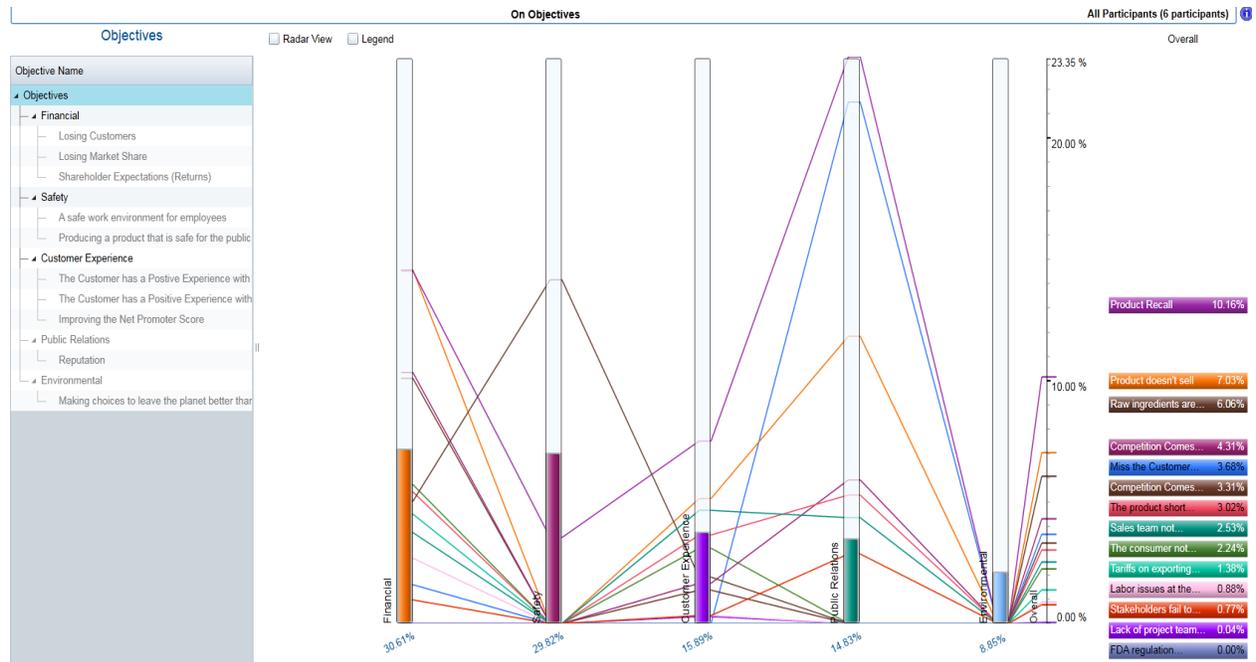


Figure 17: Sensitivity of Objectives - Performance

Risk Review and Analysis

In Figure 18 below, the chart shows the computed likelihood of events captured as percentages, and the impacts and risks as monetary values (without application of a Monte Carlo simulation). In Figure 19, the computed likelihood, impact, and risks were normalized after application of a Monte Carlo simulation. The simulation resulted in a reduction from the previous calculated total risk of \$5,649,465 to \$2,897,885.

Overall Likelihoods, Impacts, and Risks for RM2019_SJB_TDW - Risks in Launching a New Food Product to Market

No.	Event	All Participants Likelihood Computed	All Participants	
			Impact, \$	Risk, \$
[02]	Product doesn't sell	73.96%	2,406,963	1,780,247
[06]	Competition Comes out with a cheaper product	55.84%	1,734,841	968,706
[01]	Miss the Customer Ship Date	55.91%	1,357,716	759,063
[05]	Competition Comes out with product first	48.24%	1,409,949	680,132
[04]	The consumer not able to understand and reap the benefits of the product	37.39%	969,803	362,596
[08]	Raw ingredients are not available to produce the product	21.30%	1,348,412	287,193
[12]	Tariffs on exporting products	47.73%	455,052	217,212
[07]	The product short ships due to high demand, not enough pre-build of the product	21.68%	978,107	212,031
[15]	Stakeholders fail to support project	49.35%	322,342	159,090
[03]	Product Recall	3.31%	3,326,725	110,238
[14]	Sales team not appropriately trained to sell the product	8.23%	941,677	77,457
[11]	Labor issues at the production facility	8.06%	434,745	35,029
[10]	Lack of project team member availability	6.15%	7,558	464
[13]	FDA regulation changes	0.08%	0	0
			Computed Total Risk	\$5,649,465

Figure 18: Overall Likelihoods, Impacts, and Risks

Overall Likelihoods, Impacts, and Risks for RM2019_SJB_TDW - Risks in Launching a New Food Product to Market

No.	Event	All Participants		
		Likelihood Simulated	Impact, \$ Simulated	Risk, \$ Simulated ▼
[02]	Product doesn't sell	56.77%	1,628,182	924,319
[06]	Competition Comes out with a cheaper product	43.92%	1,044,047	458,545
[01]	Miss the Customer Ship Date	45.61%	869,546	396,600
[05]	Competition Comes out with product first	39.57%	788,952	312,188
[08]	Raw ingredients are not available to produce the product	19.63%	917,576	180,120
[04]	The consumer not able to understand and reap the benefits of the product	32.57%	540,081	175,904
[12]	Tariffs on exporting products	42.38%	297,201	125,954
[07]	The product short ships due to high demand, not enough pre-build of the product	20.35%	615,309	125,215
[15]	Stakeholders fail to support project	42.16%	205,619	86,689
[03]	Product Recall	3.00%	1,645,674	49,370
[14]	Sales team not appropriately trained to sell the product	7.82%	536,276	41,936
[11]	Labor issues at the production facility	8.01%	257,536	20,628
[10]	Lack of project team member availability	6.11%	6,746	412
[13]	FDA regulation changes	0.10%	0	0
Total Risk (Average Loss)				Simulated \$2,897,885

Figure 19: Overall Simulated Likelihoods, Impacts, and Risks

The loss exceedance curve is a way to visualize the risk results. This graph shows the average loss of risks without controls to be \$2.09M. Another fact highlighted in the chart is value at risk (VAR) in % or dollar value. In this example, the Riskion software was used to identify the VAR probability of 10% that the loss will exceed the dollar value of \$4.24M. This is highlighted by the intersections with the red line in the chart. A dollar value can also be entered and is shown by the green line in Figure 20. This shows that there is an 82% chance that the loss will exceed \$1.75M. The % and dollar value can be changed in the software depending on the requirements of the project.



Figure 20: Loss Exceedance Curve Data

Risk Map

The set of heat maps show the risks mapped out without controls, and again with controls after application of simulations. There are three risks that are in the red zone before application of the controls. They include *The Product Doesn't Sell*, *Competition Comes out with a Cheaper Product*, and *Miss the Customer Ship Date*. After application of the controls, there is only one risk that is partially in the red; *The Product Doesn't Sell*.

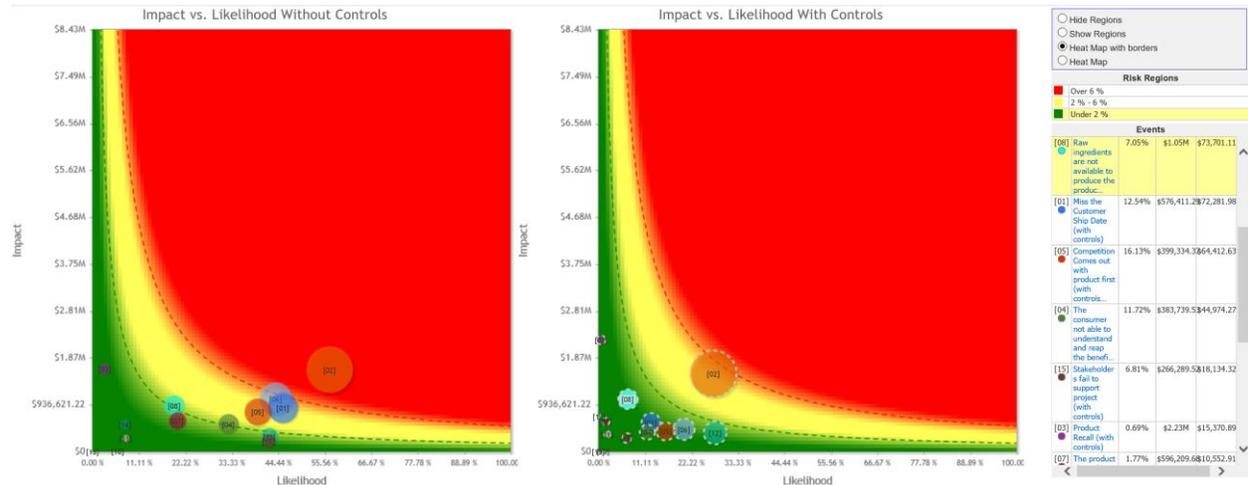


Figure 21: Heat Maps without & with Controls

Bow-Tie Diagram - Product Doesn't Sell

For the bowtie diagram, we measured four risk elements: 1) likelihood of sources; 2) likelihood of event given sources; 3) consequences of event on objectives; and 4) the importance of objectives (which aligns with the strategic vision established by management). The values presented were based on the value judgments of the CEO, CFO, and project managers.

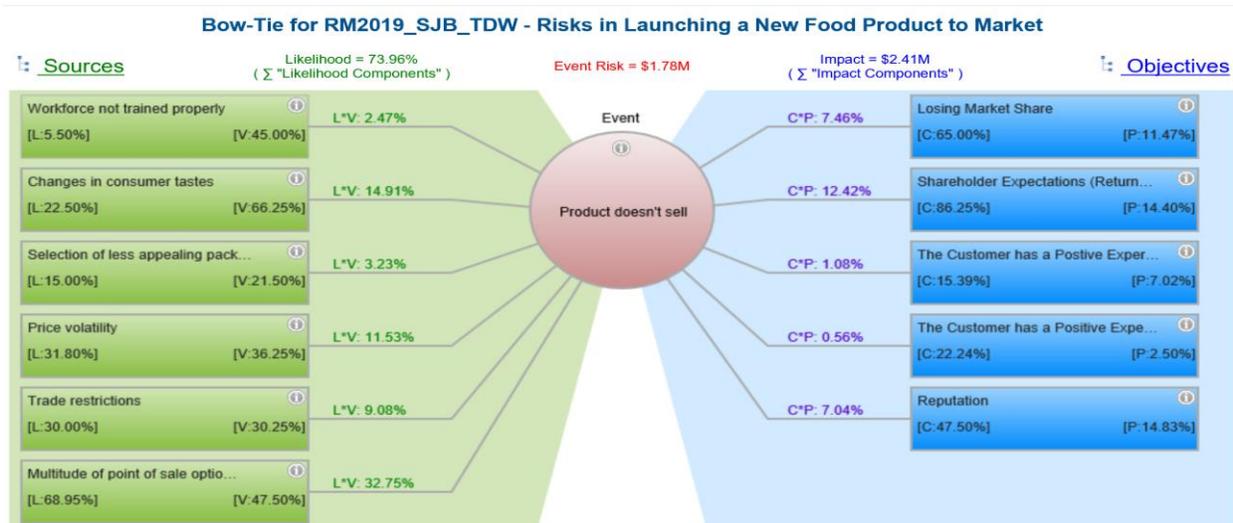


Figure 22: Bow-Tie Diagram (before Monte Carlo Simulation)

The bow tie diagram was then simulated using a Monte Carlo analysis in Riskion. The data was used to show the following results which include a reduced likelihood, based on the sum value of the likelihood of components, from 73.96% to 26.23%. The impact was reduced from \$2.41 million to \$1.63 million. Lastly overall, the event risk was reduced from \$1.78 million to \$924,319.38.



Figure 23: Bow-Tie Diagram (with Monte Carlo Simulation)

Controls

Controls for Source, Vulnerability and Consequences

The team identified controls for sources and vulnerabilities increasing the likelihood of risks. The team identified controls to reduce the consequences on objectives. For example, offering customers an incentive for future orders is intended to mitigate the consequences of missing a customer ship date.

- Controls for Source
 - Review and Update Policies
 - Qualify an additional Raw Ingredient Vendor
 - Perform Additional Consumer Testing
 - Hold Stakeholder & Sponsor Training
 - Hire Legal Counsel who Specialize in Collective Bargaining
 - Implement a Change Control Board
 - Implement Bonus Program for Reduction in Defects
 - Adapt Agile PM Methodology for More Frequent Feedback
- Controls for Vulnerability
 - Expedite Delivery
 - Pre-Select Backup Personnel
 - Price More Competitively
 - Improve Staff Training
 - Conduct Stakeholder Meetings to Gain Buy-In
 - Develop Additional Marketing Materials
 - Authorize Overtime
 - Hire a Lobbying Firm
- Controls for Consequences
 - Offer Customer Incentive For Future Orders
 - Authorize Sale Prices to Push Sales
 - Proactively Disclose Need for Recall and Cooperation
 - Diversified Offerings
 - Pre-Select Backup Staff

Dependencies

Some of the controls are dependent on another control. The control #10 Improve Staff Training is dependent on another control #1 Review & Update Policies. In this situation, the staff training can not be improved until there is a review and update of the policies, although these tasks can be concurrent or parallel.

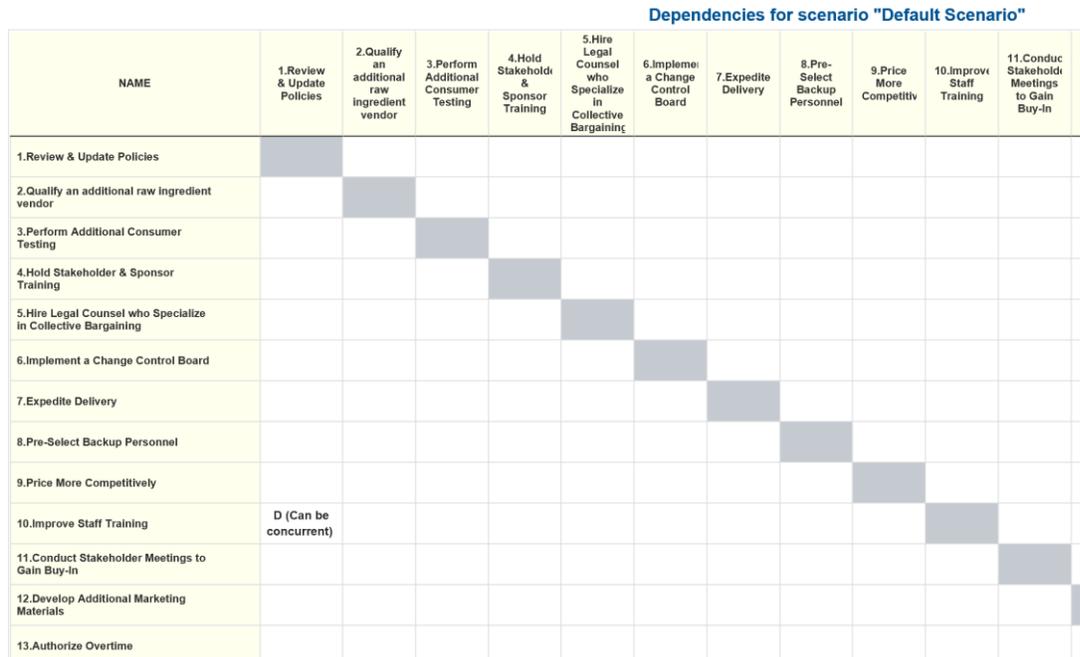


Figure 24: Dependencies

Optimized Controls - \$225,000 Budget

The budget for risk controls is determined by a percentage of the overall project budget. For this project, the budget is \$5.625M and the contingency budget is typically calculated based on a percent of the overall budget. Per the sixth addition of the PMBOK, “[t]hese reserves [contingency and management] may be used as planned to cover the cost of risk responses.” The contingency budget of this project was 4% of the budget resulting in \$225,000. With this budget, 14 controls can be implemented. Before the controls are applied, the total risks is \$2.89M, and after the 14 controls are applied, the total risks is \$0.93M, which is a reduction of \$1.97M. The 14 controls that resulted after optimization are; 1-Review and Update Policies, 2-Qualify an additional ingredient vendor, 3-Perform additional consumer testing, 4-Hold stakeholder and sponsor training, 6-Implement a change control board, 8-Adopt agile methodology for more frequent feedback, 9-Expedite delivery, 10-Pre-select back-up personnel, 12-Improve staff training, 13-Conduct stakeholder meetings to gain buy in, 17-Offer customer incentives for future orders, 18-Authorize sales prices to push sales, 20-Diversified offerings, 21-Pre-select back-up staff. When controls are marked as a “must” that means they are required. 1-Review & Update Policies is marked as a must because there is a FDA mandate about the label requirements. “Manufacturers with more than \$10M in annual sales have until January 1, 2020 to comply,” with new food label updates. When a requirement comes from a government agency, it often comes with heavy fines or penalties for not complying. That is why the control for Review & Update Policies is a “must.”

Controls optimization for "RM2019_SJB_TDW - Risks in Launching a New Food Product to Market"

Budget Risk Risk Reduction
 Budget Limit: \$

Total Risk: \$2,897,885 **Selected controls:** 14
Risk With Selected Controls: \$930,502 (Δ: \$1,967,382) **Cost Of Selected Controls:** \$215,900 (unfunded: \$414,000)
Risk With All Controls: \$876,187 (Δ: \$2,021,698) **Total Cost Of All Controls:** \$629,900
 Show Monetary Values (Value of Enterprise: \$8,429,590, Value of "Reputation": \$1,250,000)

Ignore: Musts Must Notes Dependencies Groups

Simulations Settings
 Number of trials: Seed: Keep Seed

Index	Selected	Control Name	Control for	Selected	Cost	Applications	Categories	Must	Must Not
01	<input checked="" type="checkbox"/>	Review & Update Policies	Source	Yes	9500	4		<input checked="" type="checkbox"/>	<input type="checkbox"/>
02	<input checked="" type="checkbox"/>	Qualify an additional raw ingredient vendor	Source	Yes	17000	3		<input type="checkbox"/>	<input type="checkbox"/>
03	<input checked="" type="checkbox"/>	Perform Additional Consumer Testing	Source	Yes	19500	3		<input type="checkbox"/>	<input type="checkbox"/>
04	<input checked="" type="checkbox"/>	Hold Stakeholder & Sponsor Training	Source	Yes	4200	3		<input type="checkbox"/>	<input type="checkbox"/>
05	<input type="checkbox"/>	Hire Legal Counsel who Specialize in Collective Bargaining	Source		20000	1		<input type="checkbox"/>	<input type="checkbox"/>
06	<input checked="" type="checkbox"/>	Implement a Change Control Board	Source	Yes	4000	1		<input type="checkbox"/>	<input type="checkbox"/>
07	<input type="checkbox"/>	Implement Bonus Program for Reduction in Defects	Source		88000	2		<input type="checkbox"/>	<input type="checkbox"/>
08	<input checked="" type="checkbox"/>	Adapt Agile PM Methodology for More Frequent Feedback	Source	Yes	17500	3		<input type="checkbox"/>	<input type="checkbox"/>
09	<input checked="" type="checkbox"/>	Expedite Delivery	Vulnerability	Yes	25000	13		<input type="checkbox"/>	<input type="checkbox"/>
10	<input checked="" type="checkbox"/>	Pre-Select Backup Personnel	Vulnerability	Yes	3000	6		<input type="checkbox"/>	<input type="checkbox"/>
11	<input type="checkbox"/>	Price More Competitively	Vulnerability		12000	1		<input type="checkbox"/>	<input type="checkbox"/>
12	<input checked="" type="checkbox"/>	Improve Staff Training	Vulnerability	Yes	7500	15		<input type="checkbox"/>	<input type="checkbox"/>
13	<input checked="" type="checkbox"/>	Conduct Stakeholder Meetings to Gain Buy-in	Vulnerability	Yes	6300	3		<input type="checkbox"/>	<input type="checkbox"/>
14	<input type="checkbox"/>	Develop Additional Marketing Materials	Vulnerability		17000	9		<input type="checkbox"/>	<input type="checkbox"/>
15	<input type="checkbox"/>	Authorize Overtime	Vulnerability		32000	8		<input type="checkbox"/>	<input type="checkbox"/>
16	<input type="checkbox"/>	Hire a Lobbying Firm	Vulnerability		90000	5		<input type="checkbox"/>	<input type="checkbox"/>
17	<input checked="" type="checkbox"/>	Offer Customer Incentive For Future Orders	Consequence	Yes	14000	13		<input type="checkbox"/>	<input type="checkbox"/>
18	<input checked="" type="checkbox"/>	Authorize Sale Prices to Push Sales	Consequence	Yes	13000	9		<input type="checkbox"/>	<input type="checkbox"/>
19	<input type="checkbox"/>	Proactively Disclose Need for Recall and Cooperation	Consequence		155000	6		<input type="checkbox"/>	<input type="checkbox"/>
20	<input checked="" type="checkbox"/>	Diversified Offerings	Consequence	Yes	72000	8		<input type="checkbox"/>	<input type="checkbox"/>
21	<input checked="" type="checkbox"/>	Pre-Select Backup Staff	Consequence	Yes	3400	1		<input type="checkbox"/>	<input type="checkbox"/>

Figure 25: Selected Controls

Loss Exceedance Curve

The Loss exceedance curve shows both ‘with controls’ and ‘without controls’ curves in the graph. This graph shows the average loss of risks without controls to be \$2.09M, and with controls to be \$903,502. By utilizing the optimized number of controls within the given budget, the team was able to reduce the average loss by \$1.97M. Another fact highlighted in the chart is value at risk (VAR) in % or dollar value. In this example, the Riskion software was used to identify the VAR probability of 10% that the loss will exceed that dollar value. This is highlighted by the intersections with the red line in the chart. By adding controls, the 10% probability the loss will exceed \$4.24M is reduced to \$2.26M.



Figure 26: Lost Exceedance Curve

Efficient Frontier Chart & Graph

By running 10,000 trials, the Efficient Frontier Chart & Graph in Figures 26 and 27 show the optimized controls for risks when not constrained by a budget. There is a point of diminishing returns and it appears to be after \$300,000 because the risk reduction changes only slightly from \$2.01M to \$2.02M. At the budgeted amount of \$225,000, 14 controls are funded. At \$300,000 there are three additional controls that include; Hire legal council that specialize in collective bargaining, Price more competitively and Develop additional marketing material.



Figure 27: Efficient Frontier Chart

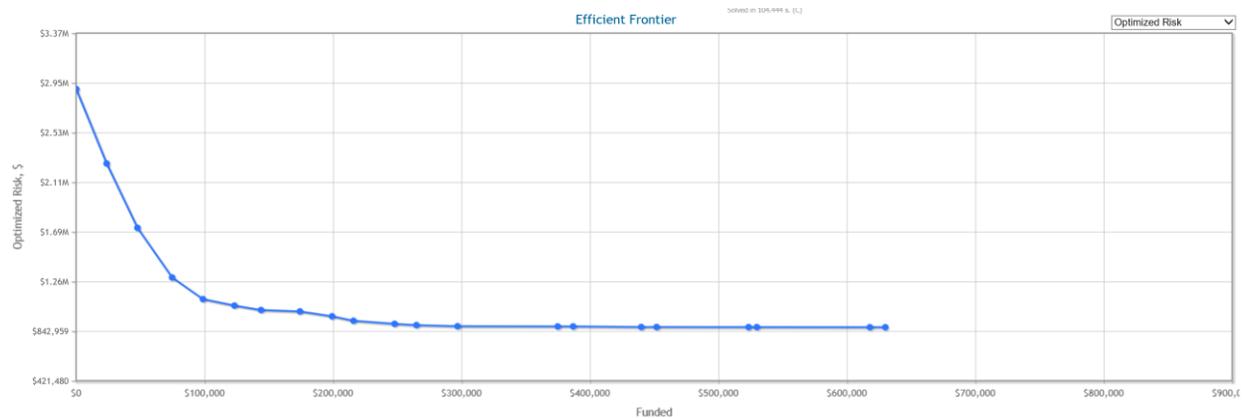


Figure 28: Efficient Frontier Graph

Conclusion

The use of risk management during the Stage Gate process is needed in order to successfully launch a new food product in the CPG industry. Having a focus on risk management continually throughout the process from the beginning of the project until completion will greatly increase the chance of having a profitable new product on the market. The risk analysis for this project outlined the events, sources, and objectives of bringing a new food product to market. Riskion software was used by the project team in order to complete the risk assessment. The software was used to measure and synthesize data in order to make recommendations regarding how to mitigate risks and optimize controls. Not only will this risk assessment help this project, future projects would be able to utilize the lessons learned from this risk analysis to benefit from as well.

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