

**VALUE OPTIMIZATION OF SOW BY-  
PRODUCTS THROUGH NEW BUSINESS  
DEVELOPMENT**

by

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## **ABSTRACT**

Johnsonville Sausage's core business is to produce premium fresh and ready to eat (RTE) sausage. To accomplish this on the fresh side of the business, the organization procures and slaughters all of their own animals. The type of animal that Johnsonville Sausage procures is called a "fancy sow". This type of sow averages 500 pounds and has had three or more litters of piglets. Johnsonville Sausage is the largest procurer of this type of sow accounting for 23% of the overall market. The largest contributor to the finished product cost is the meat. Over the last two years, the organization's business has been faced with a number of challenges related to mass liquidations within the hog industry as well as increased sow prices due to lower supplies. Specifically, these issues have impacted the expected profitability as an organization and lead Johnsonville Sausage to question whether the supply projections within the industry will meet future growth needs. Because of these factors, Johnsonville Sausage is looking at how they can create more value for the sow that is slaughtered in order to utilize the whole animal to its highest potential, increase overall profitability to the organization and increase available sow supply within the industry.

Within the business today, 55% of a sow that is harvested goes towards making the meat formulations (batter) utilized in fresh sausage production. The other 45% of the sow can be broken down into three key areas: sales credits, drop credits and rendering. Items within these three areas are classified as by-products and are sold to industries such as human consumption, pet food, pharmaceutical, medical, academia, commercial fishing and

rendering to name a few. The issue that Johnsonville Sausage faces is how to define new channels, create new products, and increase customer base and volume for those parts of the sow that are not utilized in fresh sausage production thus driving increased value for these by-product items. In conjunction with this, how do they create more profitability for those items that are consistently harvested and sold today?

The focus of this research was to create a project portfolio for the by-product business within Johnsonville Sausage. The goal of the portfolio was to identify industries and projects that would drive the greatest profit maximization for the by-product business and in return achieve the greatest return per sow. To accomplish this, optimization models and net present value (NPV) analyses were utilized. Utilizing the tools, I found that within Johnsonville Sausage's existing by-product business, they have the opportunity to increase profitability by 54% from what was achieved in 2010. In conjunction with this, a NPV analysis on a further processed pork loin was conducted. Results of this analysis proved that creating this type of concept for Johnsonville Sausage was a more value added solution financially as compared to the traditional manner in which pork loins are sold today.

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## **CHAPTER I: INTRODUCTION**

### **1.1 Thesis Objective**

The client that my thesis will be serving is Johnsonville Sausage. This particular project involves business development to drive value optimization for sows that are slaughtered within the fresh sausage production process in the organization. Johnsonville Sausage has been successful in capturing additional sow value beyond our core business of sausage production. The desire is to understand what new opportunities exist to realize greater profit per sow. There are three key objectives to this project. First, is to create additional sales of existing by-product items through expansion of the customer base within the traditional channel served today. Second, is the development of new by-product items. Lastly, is the development of new industry channels for by-product items. The project will involve the development of a business portfolio through which business cases can be created to understand higher profit per sow opportunities in the future.

### **1.2 By-Product Business Overview**

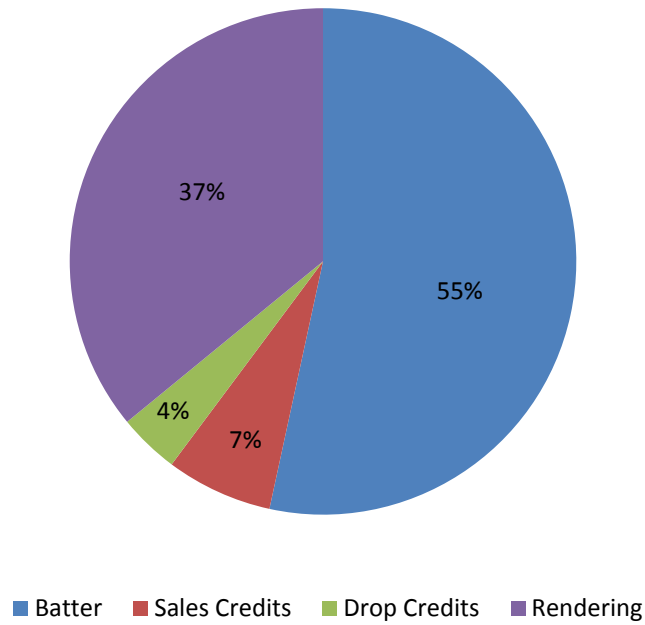
Johnsonville Sausage's core business is to produce premium fresh and ready to eat (RTE) sausage. To accomplish this, Johnsonville Sausage procures and slaughters all of their own animals. The type of animal the organization procures is called a "fancy sow". This type of sow averages 500 pounds and has had three or more litters of piglets. Johnsonville Sausage sources this type of sow because it provides the desired performance factors within the fresh products (i.e. quality, color, sensory, and cooking characteristics). Johnsonville Sausage is the largest procurer of this type of sow accounting for 23% of the overall market or 650,000 animals per year. Based on yearly projections, this number is

anticipated to grow 3% per year for the next three years. The largest contributor to the finished product cost is the meat. Over the last two years, Johnsonville Sausage has faced a number of challenges related to mass liquidations within the hog industry as well as increased sow prices due to lower supplies. Specifically, these issues have impacted the organizations expected profitability and lead them to question whether the supply projections within the industry will meet expected future growth needs. Because of these factors, Johnsonville Sausage is examining how more value for the sows that are slaughtered can be created to utilize the whole animal to its highest potential, increase overall profitability to the organization and increase available sow supply within the industry.

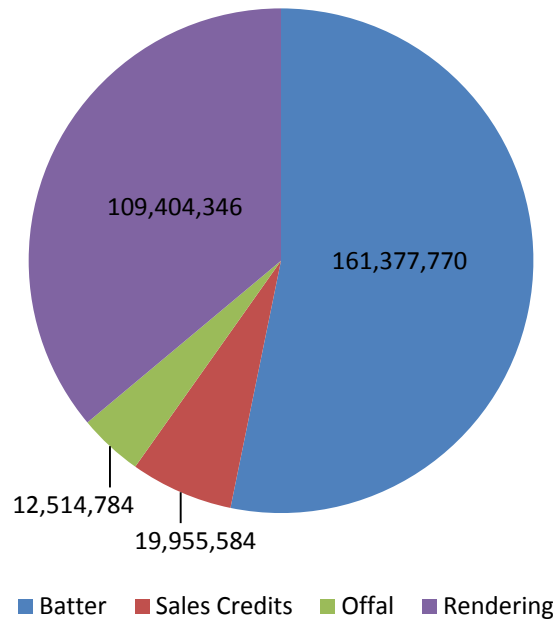
Within the business today, 55% of a sow that is harvested goes towards making the meat formulations (batter) utilized in fresh sausage production. The other 45% of the sow can be broken down into three key areas: sales credits, drop credits and rendering. Sales credits consist of whole muscle meats such as ribs, loins, tenderloins and hams and are sold to a human consumption market for further processing. Drop credits are quite cross-functional and consist of harvested items that are sold to the pet food, pharmaceutical and medical, research and education and commercial fishing industries. Johnsonville Sausage classifies rendering as its waste stream. Items are rendered when there is not customer base within the sales and drop credit categories. The value generated from these items is approximately 75% to 90% less than the value generated in the sales and drop credit categories. Sales and drop credit prices are a combination of butcher hog market prices where there was application and internal negotiation between Johnsonville Sausage and the

customer. Items within these three areas are classified as by-products. Figures 1.1 and 1.2 illustrate the breakdown of a sow into these four areas by percentage and pounds. The information was derived from Johnsonville Sausage's financial information for the year 2010 and assumes the harvesting of 584,031 sows at an average weight of 505.67 lbs.

**Figure 1.1: Animal Component Breakdown (%)**



**Figure 1.2: Animal Component Breakdown (lbs)**



Of the 45% of the sow that goes to the by-product stream approximately 30% has a consistent customer base. Within the by-product stream, the largest volume is rendering followed by sales credits and drop credits (Figure 1.2). However, rendering is sold for the lowest value per pound followed by drop credits and sales credits. The issue that Johnsonville Sausage faces is how to define new channels, create new products and increase the customer base and volume for those parts of the sow that are not used in fresh sausage production; thus driving increased value for these by-product items. In addition, how can Johnsonville Sausage create more profitability for those items that are consistently harvested and sold today?

This particular issue is important to Johnsonville Sausage for many reasons. First, it would allow the organization to be better stewards of the environment by ensuring that more parts of the animal are being fully used and not being placed into the waste stream.

Second, it would allow the organization to increase profitability by obtaining a better return on investment per sow that is even more critical in 2011 as sow prices reached all-time highs. Third, it could increase availability of sows in general due to new product developments that allow the organization to use a larger portion of the animal. Lastly, it could create additional value opportunities for other industries and organizations due to increased item availability.

### **1.3 Project Deliverables**

The deliverables for this project are multi-faceted and can be broken down into three categories: business enhancement from a process perspective, member education and development, and personal development. Within the project, there are seven deliverables that will ultimately enhance Johnsonville Sausage's by-product business and lead to future success. The deliverables can be articulated as:

1. Create an optimization model that will help the organization identify the profit maximization opportunities for 2010 and beyond. This will allow the organization to understand the gaps today within the business.
2. Create a project portfolio for the business that will identify industries and projects that will have the greatest profit for the business and in return achieve the greatest return per sow.
3. Conduct Net Present Value (NPV) analyses on all potential projects that require investment.

4. Create continuous improvement systems and tools that will allow for opportunity identification and business maintenance long-term.
5. Educate and engage the Johnsonville Sausage membership on the by-product processing and sales areas of the organization to drive personal learning, innovation and continuous improvement.
6. Enhance my personal skill set both technically and interpersonally as it relates to the business.
7. Create justification for a fulltime staff to focus on this part of the business in the long-term.

#### **1.4 Supporting Information**

Information that will be needed to support this project is multifunctional. First, there is a need to understand the items Johnsonville Sausage sells today and the customer base that has been created within the traditional sales channels. Second, there is a need to understand the values generated from the items that Johnsonville Sausage harvests and sells today within the various industries the business operates. By understanding this information, Johnsonville Sausage will know what industries the business supports today, the items harvested and the upside opportunities that exist to establish new businesses. This information will be a critical component to creating an optimization model for the business. Third, Johnsonville Sausage needs to understand the harvesting capabilities at their slaughter facilities for the various by-product items not harvested today. As new customers and industries are informed about harvesting capabilities, it is important to

understand the process at each slaughter location because they differ slightly. This will contribute to communicating the true capabilities to the customer, as well as identifying the appropriate pricing for item(s).

Fourth, there is a need to gain an understanding of industries that use porcine by-products in their finished products. Gaining knowledge about industries that use these items will allow a more robust project portfolio to be developed as well as sourcing new opportunities around both existing and new by-product items. The more new business that is developed, the greater the profit potential, which translates into greater returns per sow. Fifth, volume capabilities associated with each by-product item for the next three years needs to be understood; whether it is an existing item harvested today or a new item that Johnsonville Sausage has the capability to harvest. This information will allow the organization to understand its true capabilities based on the projected animals to be slaughtered. Sixth, contacts and a network within the various industries will be created to establish new business. This will help gain a better understanding of the by-product item opportunities, new products, and partnerships that could exist with potential customers in these industries. Seventh, is defining the value associated with each of these opportunities. Once contacts and partnerships have been established, Johnsonville Sausage will be able to better understand the financial implications associated with the opportunities within the industries. This information will be valuable to identifying resource allocation from both a personnel and monetary perspective. Lastly, net present value (NPV) analyses will be conducted for those opportunities that have the greatest potential for implementation. The

analyses will allow Johnsonville Sausage to validate those projects that have the greatest profit maximization potential and overall fit to the organization.

The information needed to support the project is going to be sourced both internal and external to the organization. Externally, the information will come from networking groups, conferences, internet searches, industry experts, organizations that Johnsonville Sausage may choose to partner with and personal contacts. Internally, the information will be obtained from data systems in place, tracked financial data, subject matter experts, leaders within the organization, organizations contracted with today and product development trials.



## **CHAPTER II: BUSINESS DEVELOPMENT IN THE PORK INDUSTRY**

### **2.1 Overview**

This chapter of the thesis will focus on three key aspects. First, it will discuss the dynamics of the pork industry both today as well as how it is expected to evolve during the next year. Second, it will provide background as it relates to the evolution of the pork by-product industry and the opportunities that exist to drive value. Lastly, it will provide a framework for value creation and business development within an organization.

### **2.2 State of the Pork Industry**

After losing \$6 billion over the last 29 months (Plain, 2010), hog producers are finally realizing upside opportunity. Beginning in October of 2007, hog producers lost money for 27 out of 29 months. The drivers of this loss included high feed costs, record pork production, a worldwide recession and the H1N1 flu tagline to the pork industry. All of these factors combined created a “perfect storm” for the industry, and did not seem to have an end in sight.

While the United States sow herd has been shrinking, sow productivity as a whole has been increasing. More pigs per litter have offset the smaller sow herd. Pigs per litter averaged 1.4% higher during December 2009 to February 2010 as compared to a year ago. The six quarters previous to this each had more than a 2% increase. This is substantially higher than the annual average increase of 0.5% realized from 2000 to 2006 (Plain, 2010). The Canadian sow herd has also declined over the last 21 consecutive quarters and isn't expected to increase anytime soon. Canada's April 2010 breeding herd inventory was down 5.8% from the previous year and first quarter 2010 farrowings were down 5.4%. The

second and third quarter farrowings saw similar results (Plain, 2010). This smaller Canadian swine herd is the primary reason for the decline in live hog imports.

United States pork exports in 2009 were down 11.6% from the year before, but still was the second highest volume ever. In 2010, pork exports are expected to be 5% to 7% higher than in 2009 (Plain, 2010). Not only is there less pork on the market, but there are less competing meats as a whole. High feed costs have caused herd contractions in all livestock species. The most important factor affecting on future hog prices will be determined by what happens in the United States economy. If economic growth is fast enough and lasts long enough, then the odds are good that high hog prices will last. If this does not happen, then the strong prices will not be sustainable. The forecast for 2010 is that hog prices will be 35% higher than 2009 and that this rate of growth will continue into 2011 (Plain, 2010). However even with these increased prices, hog producers will require a long time to recover from the red ink of the last two years. It is expected that the dynamics of the industry and the past years price challenges will continue to move the industry away from small operations into large super farms.

### **2.3 History of Pork By-Products**

Pork by-products are produced by slaughterhouses, meat processors, wholesalers and rendering plants. Traditional markets have been gradually disappearing as a result of low prices and health concerns. In response, suppliers have directed their marketing and research efforts towards non-food industries such as pet food, pharmaceuticals, medical, cosmetics, zoological, vitamin and supplement, and animal feed. Pork by-products represent approximately 52% of the live weight of a hog. The by-products from this

portion of the animal are typically not suitable for normal consumption because of physical and chemical characteristics. As a result, valuable sources of potential revenue are lost, and the cost of disposing of these items is increasing. In addition to these economic losses, the unused by-products may cause environmental pollution issues through the waste stream. There is an opportunity in improving utilization of these by-products. By increasing utilization by other industries, suppliers of pork by-products can increase profitability and improve the environment by decreasing the amount of waste generated.

The meat industry in the United States considers everything produced by or from the animal, except dressed meat, to be a by-product. These by-products can be divided into two classes, edible and inedible. Yield of edible meat by-products from a hog is approximately 6.7% of the carcass weight. Table 2.1 (Liu, 2002) depicts world production of edible by-products from hogs in 1996.

**Table 2.1: World Production of Pork By-Products**

<u>Country</u>	<u>Carcass Weight</u>	<u>Production</u>	<u>Percentage</u>
World	77,985	5225	100.00
Asia	42,534	2850	50.40
China	40,000	2680	47.40
Japan	1,264	85	1.50
Taiwan	1,270	85	1.50
North America	9,005	603	10.70
United States	7,765	520	9.20
Canada	1,240	83	1.50
South America	1,560	105	1.80
Brazil	1,560	105	1.80
Europe	16,269	1090	19.30
Germany	3,085	207	3.70
France	2,193	147	2.60
Spain	2,180	146	2.60
Russia	1,679	113	2.00
Netherlands	1,619	109	1.90
Poland	1,600	107	1.90
Denmark	1,528	102	1.80
Italy	1,355	91	1.60
Belgium-Luxemburg	1,030	69	1.20
European Union	15,043	1008	17.80
Unit: 1000 mt			
* Based on 6.7% carcass weight			
Source: National Pork Producers' Council, Pork Facts 1997/1998			

Edible by-products include organs such as hearts, tongues and livers or external parts such as feet, ears and tails. Ethnic markets are generally the purchasers of these types of items, often at normal retail prices, and in some cases, a premium price. They often require treatments such as collection, washing, trimming, chilling, packaging and cooling. Consumer acceptance is dependent on a number of factors including nutrient content, price

and comparable competing products. Regulatory requirements play a key role in determining demand. Many countries restrict the use of edible meat by-products for reasons of food safety and quality. Table 2.2 (Liu, 2002) depicts potential uses and preparation methods for edible pork by-products.

**Table 2.2: Uses and Preparation Methods for Edible Pork By-Products**

<u>Kind of Meat</u>	<u>Storage and Preparation</u>	<u>Way in Which it is Used</u>
Liver	Frozen, fresh or refrigerated	Braised, broiled, fried; in loaf, patties and sausage
Kidney	Whole, sliced or ground Fresh or refrigerated	Broiled, cooked in liquid, braised, fried, in stew and soup
Heart	Whole or sliced Frozen, fresh or refrigerated	Braised, cooked in liquid, roasted, stuffed, in luncheon meat, patties, loaf and as sausage ingredient
Brains	Whole or sliced	Broiled, braised and cooked in liquid, poached or fried
Tongue	Frozen, fresh or refrigerated Whole	Broiled, stewed, jellied, grilled, cooked in liquid
Stomach	Fresh, refrigerated	Honeycomb tripe and as container for haggis
Sweetbread	Fresh and refrigerated	Fried, broiled, braised, poached with sauce or cream, cooked in liquid
Spleen	Frozen, fresh, refrigerated Whole	Ingredient in pies, blood sausage, variety meats
Intestines	Frozen, fresh, refrigerated Remove feces, soak, wash, salt before use	Sausage casing
Cheek and Head Trimmings	Frozen, fresh, refrigerated	Cooked sausages, stews soups
Testicles	Frozen, fresh, refrigerated	Fried
Lungs	Fresh, refrigerated	Haggis, pet food
Feet	Frozen, fresh, refrigerated	Jelly
Fat	Frozen, fresh, refrigerated	Shortening, dripping, oleomargarine, chewing gum
Blood	Frozen, refrigerated	Black pudding, sausage, blood and barley loaf
Bone	Frozen, fresh, refrigerated	Gelatin, soup, jelly, mechanically deboned tissue

Source: Deng-Cheng Liu, Better Utilization of By-products from the Meat Industry 10-01-2002

The remaining 45.3% of the hog that makes up by-products can be classified into inedible by-products. This class includes products geared towards many industries such as spleens, lungs, trachea, condemned livers, ears and snouts that are sold to pet food manufacturers. Hides and skins are further defleshed and semi-processed before being exported to the Asian market for leather. Linings of hog stomachs are processed into Pepsin and heart valves are salvaged for use in the pharmaceutical and medical industries. Blood is further processed into animal feed components. Lastly meat scraps, inedible fat and ground up bones are cooked and mixed together to produce meat and bone meal.

Use of the whole animal has been a focus for the meat industry for a number of years. The dynamics of the by-product environment, however, are changing. An increased concern over health has driven suppliers to define new technologies to permit more efficient use of these by-products. Competition has been a strong incentive to create efficient technologies and operations. This is important because increased profits and lower costs are required in the future for the meat industry to remain viable. Innovation will also be a key to increasing profits to both the livestock producer and the processor. Opportunities that the by-product area of the meat industry face include valuation, export hurdles, raising the awareness and priority of its value within the industry and shared learning of product opportunities within industries outside of the meat industry. To create success for the pork by-product sector in the future, these opportunities need to be addressed through new innovations and technologies that will drive supply and value optimization.

## **2.4 The Process of Value Creation**

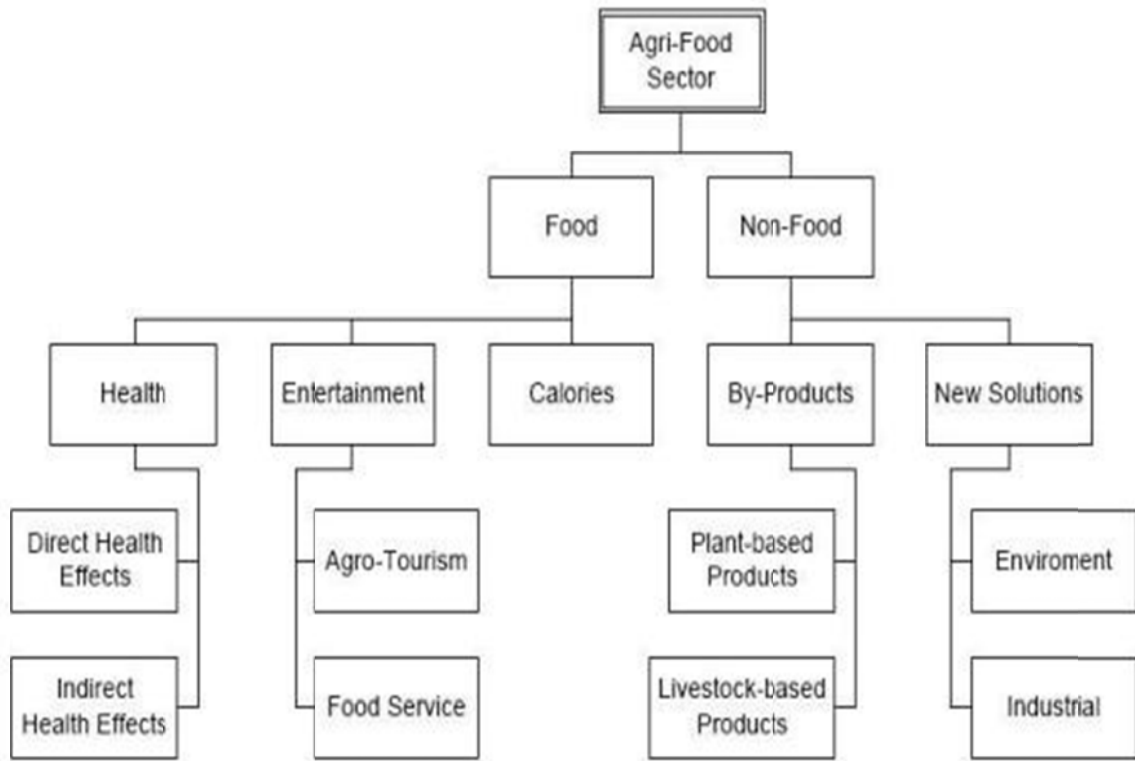
An initiative will qualify as value-adding under one of two conditions: (1) if one is rewarded for performing any activity that has traditionally been performed at another stage further down the supply chain; or (2) if one is rewarded for performing an activity that is discovered to be necessary but had never been performed in the supply chain (Amanor-Boadu, 2009). The initiative will cease to be value-adding if those benefiting from it are unwilling to reward those performing it. This typically happens when competitive pressures are created and the activity that has created value is traditionalized. It is important that an organization recognizes that commoditization is a real possibility when embarking on value-adding initiatives. Within a strategy, obsolescence needs to be factored in to provide a sustained competitive advantage. The value-adding process needs to be motivated by the right market signals. In essence, the downstream customer in the supply chain must be willing to reward you for the value performed.

Successful value-added initiatives are innovation driven (Amanor-Boadu, 2009). Innovation creates new products and services. If customers demand these new products and services, then the value-adding initiative has been successful. As we look at the agri-food sector, it can be classified into two main branches: food and non-food. The food branch focuses on consumer objectives embedded in food. The non-food branch has many opportunities geared more towards new solutions and by-products. Figure 2.1 (Amanor-Boadu, 2009) depicts the opportunities within the agri-food sector. It is critical that an organization identifies product and service gaps in the marketplace and along the supply



chain. By doing this, they can develop strategies that allow the highest probability of success and improve the company's net income situation.

**Figure 2.1: Opportunity Scoping Framework in the Emerging Agri-Food Sector**



Source: Vincent Amanor-Boadu, Preparing for Value-Added Business Initiatives August 2009

There are five critical steps to creating a framework for value-added initiatives that will enhance net incomes. Figure 2.2 (Amanor-Boadu, 2009) shows the linkages required within these five areas to create a successful initiative. These five steps are: maximize internal efficiencies, opportunity scoping, resource gap assessment, technical and economic feasibility analysis and preparing for implementation.

**Figure 2.2: Succeeding at Value-Added Initiatives**



Source: Vincent Amanor-Boadu, Preparing for Value-added Business Initiatives August 2009

To maximize internal efficiencies, a business must ensure that it is achieving the maximum gross margins from its operations. By accomplishing this, an organization can yield significant improvements in net revenue with little or no extra effort. There should be no implementation of value-added initiatives until this step is completed. If internal efficiencies are not maximized before implementing value-added initiatives, then the organization will be vulnerable to price and market risks. Opportunity scoping is characterized not only by how financially attractive a product or service is to the end user

but also by how timely that value is. When scoping opportunities, there are five basic questions that an organization should ask itself. They are (Amanor-Boadu, 2009):

1. What is the opportunity?
2. How big is the opportunity relative to its alternatives?
3. How sustainable is the opportunity in its marketplace?
4. Who are the incumbent players?
5. Will the dogs eat the dog food – is there a point of difference that separates your organization’s offering to that of your competition?

The resource situation assessment evaluates the resource requirements necessary to transform the opportunity into reality. It validates the organization’s ability to successfully take the opportunity and identify the resource gaps that need to be filled to create success. Five fundamental questions that should be asked by the organization at this stage include (Amanor-Boadu, 2009):

1. What resources are required to credibly seize the opportunity?
2. How much of these resources are needed to successfully seize the opportunity?
3. How much of the resources exist within the organization?
4. Does what we have allow us to present a credible market position?
5. If we need more resources to present a credible position, do we rent, buy or make them?

The feasibility and economic analysis allows an organization to validate the technical and business models against the opportunity identified. It is important that an organization does not limit itself to the “most likely scenario” and that they do not focus on averages because all averages have variability. They should evaluate the range of possibilities to provide accurate information regarding risks and expectations. Probabilities of the outcomes will help the organization determine how lucrative the opportunity is as well as define alternate strategies that will allow minimal adverse market effect. Once an organization has finalized the technical and feasibility analysis, they are prepared for implementation. Through this step, an organization defines the opportunity and the effect it will have on their current operation. They will better understand the limitations of their skills in transforming the opportunity into reality. All of these areas combined determine whether the organization is ready to implement the opportunity or not.

Determining the value of pork by-products is not an easy task. There are a number of factors that impact this such as lack of USDA pricing information, supplier reluctance to share information within the industry, seasonal and market fluctuations, variability in transportation costs, lack of mandatory reporting within the industry and variability in collection procedures. Addressing these challenges head on and defining actions to solve them will only allow the process of value creation to flourish.

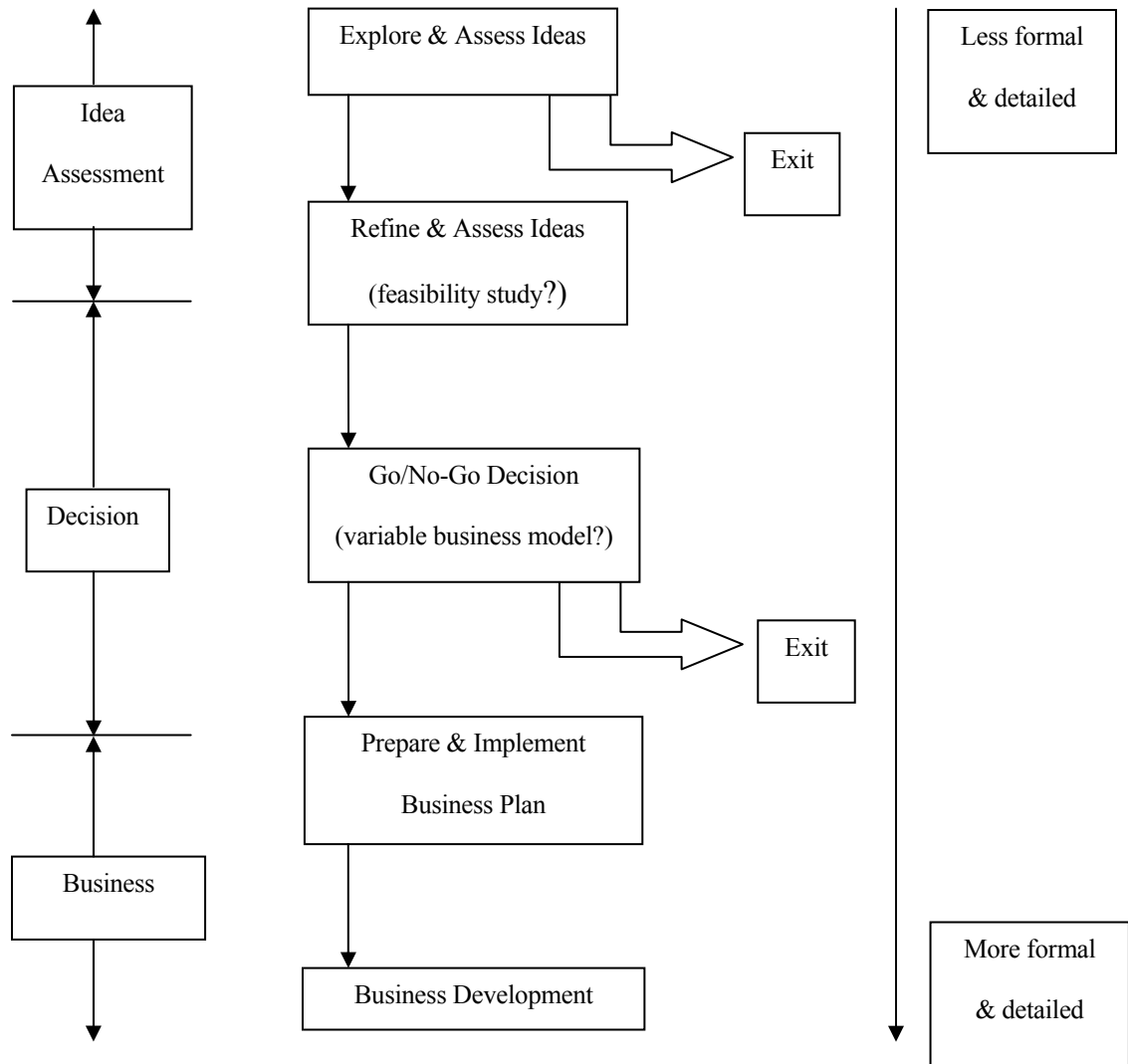
## **2.5 The Process of New Business Development**

In business development, if an organization does not follow a process, then they run the risk of revisiting the same issues again without making progress as well as finding themselves repeating the same mistakes. Not only does this waste time, but an

organization also runs the risk of making poor decisions that can impact its future success.

Figure 2.3 (Hofstrand, 2009) depicts a model for business development that may not guarantee business success but will definitely increase an organization's chances of success.

**Figure 2.3: Idea Assessment and Business Development Process**



Source: Don Hofstrand, Idea Assessment/Business Development Process August 2009

In the first step of idea exploration, identification and assessment, an organization generated ideas from a number of sources. Regardless of where these ideas originate, an organization should use the following approach to formulate the business concept. The approach consists of forming a project committee, formulating general ideas and concepts, identifying alternative business models for the idea, investigating an idea/concept and alternative business scenarios, formal investigation, and further refining of scenarios (Hofstrand, 2009). Forming the project committee involves bringing individuals together that have the skills to investigate the idea/concept and can carry it through to implementation based on its viability. Formulating a business idea/ concept requires that an individual or group define why it has merit. It could involve fulfilling an unmet need in the marketplace, providing a new form to an existing product, producing a better or cheaper offering than your competitors, or other ways in which value can be added for the customer. An idea/concept is only viable if people are willing to pay for what the organization is providing.

A business model for an organization describes how it will function as it relates to producing the product or service and providing it to the customer. The framework should contain the essential business elements required to achieve success. It is important to conduct an initial informal investigation of the validity of the idea and investigate the models. Only identify business models that are valid and eliminate those that are not. An organization may want to conduct a formal assessment such as a pre-feasibility study or marketing study. From this, you have the ability to eliminate models that are not viable or identify new ones. When refining models, select only those options that are viable and

eliminate the rest. As an organization goes through step one, it should accomplish two things: reduce the number of models under further study and refine the remaining models.

In step two of idea and model deliberation and assessment, the critical factors of success include: further refining the business models, conducting a feasibility study, analyzing the feasibility study and further refining the idea and model as depicted in Figure 2.3 (Hofstrand, 2009). Before an organization conducts a feasibility study, it is critical that they refine their idea to one or a small number of specific and detailed models. Once this is done, a feasibility study can be conducted that will provide comprehensive information on the market, operational, technical, managerial and financial aspects of the project. These factors allow the organization to understand the economic impact of the project. Once the feasibility study is complete, it is important that the organization analyzes it for completeness and accuracy before proceeding further with the project. It is important that the study addresses the issues identified and does a thorough investigation of those issues. Challenge the assumptions and conclusions of the study to ensure accuracy. Once this is complete, the project is ready for the next step in the process.

Step three of the business development process is the go/no go decision depicted in Figure 2.3 (Hofstrand, 2009). This is by far the most critical step in the process. It is the point of no return so an organization needs to ensure that they have no unresolved doubts or reservations about the project. Inclusion, openness and honesty are critical to the discussion when making the decision to ensure the future success of the organization and the project. Commitment to the project is another important factor to consider before moving forward with the project. Starting a new business requires a great deal of time and

effort. It is important that the organization and individuals involved understand this and are committed to the effort. Within this step, one of three possible outcomes will take place: the project will be deemed viable and the organization moves forward, the organization decides to perform more studies and/or analyze additional alternatives, or the project is deemed not viable and is terminated.

In the event that the project is deemed viable and the organization moves forward, they enter into step four, which is business plan preparation and implementation as depicted in Figure 2.3 (Hofstrand, 2009). A business plan is a blueprint of how the organization will create the new business. Planning involves considerable time and effort; however, it is the easiest part of the business plan. Implementing the plan is by far more difficult. Improper implementation of a business plan can cause problems and/or failures for an organization. Unforeseen problems will emerge in these efforts. It is critical that an organization and the individuals working on the project are persistent and dedicated to the cause. Without this commitment, the new business will not succeed.

The last step in the process is business operations depicted in Figure 2.3 (Hofstrand, 2009). Once the value-added business has started, the work has just begun. It takes constant attention for the business to remain healthy and viable. Operating a business requires different skills than starting a business. Because of this, an organization needs to evaluate who the right individuals are to manage the business. Those individuals involved in creating the business may not be the right individuals to operate the business.



The five steps of the business development process allow an organization to take an idea and convert it into a viable and sustainable business as depicted by the business development model (Figure 2.3). These five steps won't guarantee success; however, they should increase the odds of success for an organization and make more efficient use of its time.

## **2.6 Summary**

The concepts of value creation and business development are critical factors in driving future profit maximization and return per sow within Johnsonville Sausage's by-product business. The models discussed in this chapter provide a roadmap for the commitment required from the organization and the actions to be defined and implemented to achieve success and longevity. Using the models and the principles they embody allows Johnsonville Sausage to achieve the three key objectives for the future which include:

1. Create additional sales of existing by-product items through expansion of the customer base within the traditional channel we serve today.
2. Development of new by-product items.
3. Development of new industry channels for by-product items.

## **CHAPTER III: JOHNSONVILLE SAUSAGE'S BY-PRODUCT BUSINESS**

### **3.1 History of Johnsonville Sausage**

Johnsonville Sausage began in 1945 in the town of Johnsonville, Wisconsin by Ralph F. and Alice Stayer. Quality product, extraordinary-tasting sausage and hard work were and continue to be the foundation of the organization. Today, under the leadership of Ralph C. Stayer, Johnsonville Sausage has grown to become America's favorite bratwurst and has quickly expanded into multiple sausage categories. Johnsonville Sausage is recognized as #1 in fresh bratwurst, fresh Italian sausage, fresh breakfast sausage, smoked/cooked sausage and summer sausage. The organization has built a reputation as an innovative, customer-oriented producer of the highest quality food products. This reputation has allowed the organization to expand its product offerings domestically to the 50 states and internationally to 30 countries.

### **3.2 Culture as a Competitive Advantage**

The guiding principle for the organization is rooted in "The Johnsonville Way". The Johnsonville Way has allowed the organization to create a foundation that facilitates operation in a blue ocean more effectively than the competition. Blue ocean represent unknown market spaces and denotes industries that are not in existence today as compared to red oceans in which there is known market spaces and industries exist. Johnsonville Sausage's philosophy is that the only way to beat the competition is to stop trying to beat the competition and to create new industries and market spaces. The culture has been created such that every member has the ability to be an entrepreneur, take risks without fear of repercussion, innovate and express their creative being, stretch and grow and be

accountable for making a difference. It is this philosophy that allows the organization to achieve value optimization for the animals it slaughters discussed in the previous chapter.

The organization has to be better than anyone else at making and keeping customers which is not accomplished by only focusing on the things that made Johnsonville Sausage successful previously but its culture. It requires that value innovation is created; which is the cornerstone of blue ocean strategy. The company focuses on making the competition irrelevant by creating a leap in value for customers and Johnsonville Sausage, thereby opening up new and uncontested market space. The power of “The Johnsonville Way” is articulated in the body of the concept:

*“We at Johnsonville have a moral responsibility to become the Best Company in the World.*

*We will do this as each one of us becomes better than anyone else at defining, and then serving, the best interests of all those who have a stake in our success.*

*We will succeed by setting near-term objectives and long-term goals that will require personal growth and superlative performance by each of us. We will change any objectives or goals that no longer require personal growth and superlative performance to ones that do.*

*As an individual, I understand The Johnsonville Way is about my performance and my accountability to the team. My commitment to stretch, grow and excel is an unending one.*

*This is The Johnsonville Way and I am committed to it.”*

The culture that “The Johnsonville Way” has created within the organization facilitates value innovation by each of its members. It is ingrained in each of the critical aspects of the Johnsonville Strategy (Figure 3.1). The challenge presents itself in applying this foundation across all aspects of the business. Within the core business of sausage making, Johnsonville Sausage is the industry leader and on the cusp of creating blue oceans within the by-product business. The challenge for the future lies not only in leveraging “The Johnsonville Way”, but creating focus, divergence and a compelling tagline, thus facilitating blue oceans within this part of the organization.

### **Figure 3.1: Johnsonville Strategy Statement**

**Mission Statement:** Create an environment that requires each member to fully develop their God-given talents. We achieve this by living the Johnsonville Way.

**Values:** Integrity, Innovation, Continuous Learning, Teamwork, Commitment

**Vision:** To become the best company in the world (that just happens to make sausage).

**Overall Strategy:** By being the best at driving our customers’ sales and profits (HICS) through noticeably better products and services within premium sausage categories, we will earn the right to become a billion dollar company by 2012.

### **3.3 Implementing Change to Drive Value Optimization**

What sets Johnsonville Sausage apart? The culture that has been created within the organization facilitates entrepreneurship, change, growth and development, accountability, continuous improvement, teamwork, creativity and innovation and superlative performance. It is this type of culture that allows Johnsonville Sausage to pursue the value optimization of by-products and make an impact. The first step in the implementation is to create a business case to facilitate the change needed to address the by-product business. This step was completed and presented to a number of functional teams within the organization as well as top leadership. Based on the business case, a new position (Director of Business Development – Sow By-products) was created within the organization to support the by-product business in addition to the Sow By-product Sales Coordinator already in existence. The new position is tasked to develop and grow new customers and channels of business by crossing over into new industries. These industries include, but are not limited to, pet food, zoological, pharmaceutical and medical, human consumption, vitamins and supplements, animal health and bio-fuels. By accomplishing this, Johnsonville Sausage has the ability to use by-products that currently flow to the waste stream, thereby increasing the profitability per sow. In addition, value optimization opportunities within the existing customer base related to the volume sold need to be identified. Adding this position to the organization allows it to double its resources and business development opportunities. This shows that the by-product business is critical to future success and therefore needs to be a focus and a priority.

The next step is to create a clear vision and strategy that aligns with the organization's vision and strategy. Creating and implementing a vision provides a

foundation for the business. Without a vision, a clear roadmap of what you wish to accomplish does not exist, nor does it allow you to create a strategy on how to achieve it. The development of an effective vision begins by recognizing ways in which a business can create superior value. A vision statement is an organization's plan of attack on how to create this value. The vision should be based on a realistic assessment of the business's capabilities that includes those improvements it needs to make. In addition, it should be based on a detailed analysis to determine the opportunities for which these capabilities can create the most value. The vision should be the guide for all that the business does. It also needs to take into consideration that, over time, competition will erode profitability for every product or innovation. Because of this, an organization needs to continually renew or replace the product or innovation to slow down this inevitable erosion. Ultimately, a business needs to apply the processes of experimental discovery and creative destruction to its vision, strategies, products, services and methods thus allowing innovation and creativity to flourish.

Creating a compelling vision and strategy for the by-product business will require the engagement of members and drive innovation related to new ideas and solutions that will ultimately benefit both customers and the organization. Creating trust within these groups will be critical to the success of the vision. Trust enables people to accomplish things that would otherwise be impossible. The roadmap for the vision will allow better leveraging of "The Johnsonville Way" into this part of the business and ultimately increase profitability to the organization. This increased profitability translates to more incentives for each and every member of the organization by increasing great performance share

(GPS) and profit sharing. These incentives guide members towards areas where their attention and effort create the most value. Johnsonville Sausage's belief is that proper incentives must not only motivate members to create value and signal what is valued, but they also must motivate employees to create that value in a principled manner.

Innovation will be critical to the success of the journey. Charles Koch expressed the critical components in his book "Science of Success". In his opinion, innovation begins with a passionate preoccupation with a problem and the courage to pursue a solution. It demands personal commitment and a great deal of focused intellectual and emotional energy. This is facilitated by having the right people in the right roles with the right skills and value. Innovation is enhanced by seeking critical feedback from others who have a diversity of knowledge and perspectives. It also requires a culture in which exploration, experimentation and discovery are not stifled by fear of failure. The culture must be reinforced by incentives that reward prudent risk-taking necessary for innovation. Innovation entails the right combination of discipline and freedom. Those contributing to innovation must be given every possible encouragement and latitude consistent with their performance and capabilities (Koch, 2007). At Johnsonville Sausage there is a strong alignment to Koch's beliefs as it relates to innovation especially within the core business of sausage making. The alignment in these beliefs and the culture that has already been created to support these beliefs only facilitates improvements within the by-product business. These improvements will be critical for future growth and prosperity both for the customer and the organization.

As Johnsonville Sausage looks to create value for the end-user, it is important that they define strategies that leverage the six key paths talked about in “Blue Ocean Strategy”. Blue oceans in the by-product business should be created and not get stuck in the red ocean similar to other organizations. The red ocean is defined as selling by-product items specifically on the commodity market and not driving innovative solutions that would allow an organization to create a higher level of profitability based on movement up the value chain. To do this effectively, the organization needs to (Kim and Mauborgne, 2005):

- Look across alternative industries,
- Look across strategic groups within industries,
- Look across the chain of buyers,
- Look across complementary product and service offerings,
- Look across functional or emotional appeal to buyers,
- Look across time.

By keeping these strategies in the forefront, Johnsonville Sausage will be able to drive a higher value creation for the customer. It will allow the organization to anticipate customer needs and desires before the customer, inevitably driving long-term profitability for the organization. The journey will not end because as goals and objectives are achieved, new and aggressive ones will be found that require superlative performance and stretching and growing by each of the members in the organization.

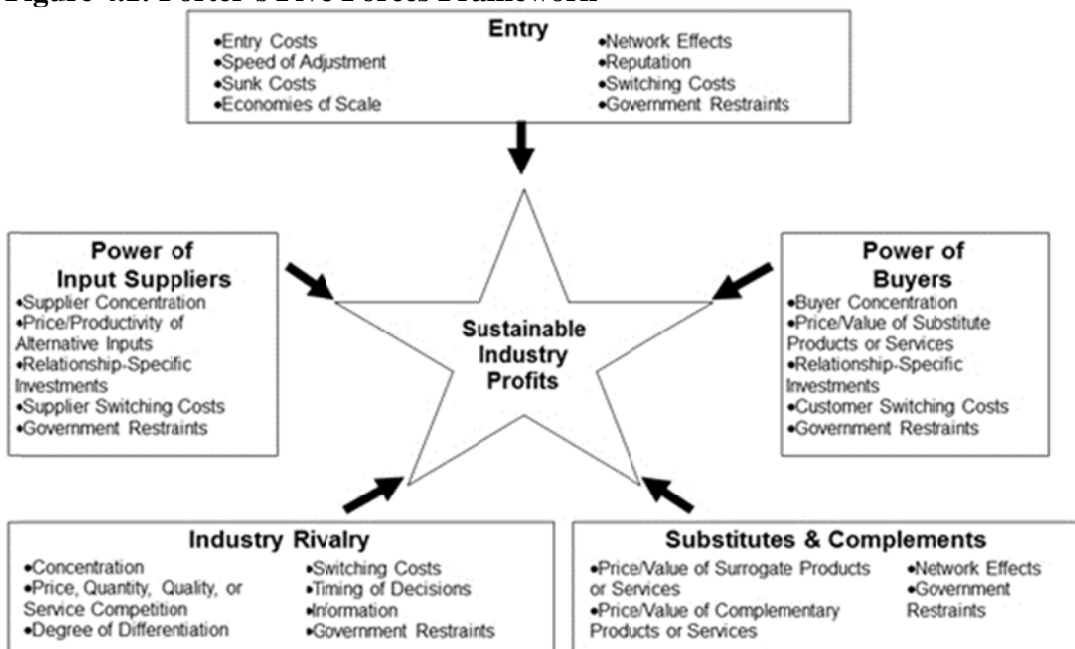


## CHAPTER IV: PROFIT MAXIMIZATION IN THE BY-PRODUCT INDUSTRY

### 4.1 Overview

Profits within an organization are a signal as to what products are most highly valued by society and their customers. Ultimately, resources flow into the industries that create the most value for society. The Five Forces Framework (Figure 4.1) provides a visual depiction of the principles encompassed in this product flow.

**Figure 4.1: Porter's Five Forces Framework**



Source: Michael E. Porter, *Competitive Strategy: Techniques for Analyzing Industries and Competitors* 1980

The Five Forces Framework allows an organization to better understand the following:

1. The potential threat of new sellers entering the market.
2. The power exerted by customers in the market.
3. The impact of suppliers on the sellers.
4. The rivalry between existing sellers in the market.

5. The threat of substitute products becoming available in the market.

Understanding the nature of each of these forces provides organizations with the necessary insights to formulate strategies that will deliver sustainable industry profits. The thesis will focus on maximizing profit within Johnsonville Sausage's by-product business. More specifically, the objective is to drive value creation for the items harvested to maximize the return per sow.

#### **4.2 Profit Maximization Fundamentals**

When an organization is trying to maximize its profits, it is really looking to maximize its shareholder value. Maximizing the value of an organization looks at the present value of current and future profits. The concept of profit maximization is frequently used in microeconomics because it is a good predictor of business behavior and analytical complications that are not value added can be avoided. Ultimately, profit within an organization is maximized when:

$$MR - MC = 0, \text{ so that}$$

$$MR(q) = MC(q)$$

Marginal revenue (MR) is the change in revenue associated with the last unit of output. In a competitive organization, MR is going to be the market price. Marginal cost (MC) is the change in total costs that arise as a result of variables that management controls. It is the additional cost incurred as a result of an additional unit of the input. Within the concept of profit maximization, basic principles can be modified to deal with uncertainty.

### 4.3 Short and Long Term Profit Maximization

An organization that operates with a fixed amount of capital must choose levels of its variable inputs, such as labor and materials, to maximize profits in the short-term. In the short-term, an organization may not always earn a profit or leave the industry entirely if they are losing money. The organization may choose to operate at a loss in the short-term because it is anticipating that it will earn a profit in the future. They may choose this course of action for a number of reasons. Some of these reasons include: anticipation that the price of their product will increase, the cost of their production will fall on because if they were to stop production and start back up at a later date, it would be more costly due to adjustment costs. The organization that is losing money has two options in the short-term: they can produce some output or stop producing temporarily. The organization will ultimately compare the profitability of producing with not producing and choose the preferred option. They should shutdown if the price of the product is less than the average variable cost (AVC) of producing the product. If the organization chooses the option of shutting down, their losses will equal their fixed costs because these costs must be paid regardless of whether output is produced or not. As the quantity of output in the organization increases, average fixed cost (AFC) will decrease, and as the output quantity decreases, the AFC will increase. Average fixed cost is defined as:

$$AFC = FC/Q, \text{ where}$$

FC is fixed cost and

Q is the number of output units.

In long-term profit maximization, an organization alters all of its fixed inputs (capital, plant size, etc.) to minimize the costs associated with producing an output at a desired level. The organization operates on the long run average and marginal cost curves.

All costs are variable such that:

$$ATC = AVC = LRAC, \text{ where}$$

ATC is average total cost,

AVC is average variable cost and

LRAC is long run average cost.

There are two questions that need to be answered to choose the profit maximizing level of output:

1. Should the organization produce any output at all and remain in the industry?
2. If the organization remains in the industry, how much output should they produce?

If the production of outputs results in economic profits greater than or equal to zero, the organization should remain in the industry. If not, there is at least one input that may be more highly valued in another industry. For organizations that remain in a competitive industry and want to determine the level of output to produce, the following rule should be used:

$$P = LRMC \text{ (long run marginal cost)}$$

An important principle to keep in mind is that maximizing short-term profits may maximize long-term profits. If the growth rate in profits is less than the interest rate and

both are constant, maximizing long-term profits will maximize short-term profits (Baye, 2009).

#### **4.4 Profit Maximization in Perfectly Competitive and Monopolistic Markets**

The by-product industry, in its traditional form, is a commodity driven industry, and therefore; is very competitive. Today, Johnsonville Sausage's by-product business falls into a perfectly competitive market. The key conditions that exist in a perfectly competitive market are (Baye, 2009):

1. There are many buyers and sellers in the market, each of which is "small" relative to the market.
2. Each firm in the market produces a homogeneous (identical) product.
3. Buyer and sellers have perfect information.
4. There are no transaction costs.
5. There is free entry into and exit from the market.

In a perfectly competitive market, an organization should produce so that price is equal to marginal cost, provided that price is greater than or equal to average variable cost. In the event that price is less than average variable cost, the organization should shutdown to minimize its losses. Organizations that operate in a perfectly competitive market should focus on producing the appropriate amount of outputs and keep costs low.

Johnsonville Sausage's by-product business may operate in a monopolistically competitive market. The conditions that exist in this type of market are (Baye, 2009):

1. There are many buyers and sellers.

2. Each firm in the industry produces a differentiated product.
3. There is free entry into and exit from the industry.

Comparing monopolistic competition and perfect competition, the key difference is that each organization produces a product that differs slightly from the other organizations' products under monopolistic competition. In a monopolistically competitive market, an organization should produce where its marginal revenue equals marginal cost. The organization must recognize the relationship between price and quantity as well as ensure their products are differentiated from others in the market.

#### **4.5 Application to Johnsonville Sausage**

As Johnsonville Sausage seeks to maximize profitability in its by-product business, it is important to use the concepts in this chapter. Maximizing profitability allows the organization to realize a greater return per sow which is critical as sow prices are projected to be at all-time highs in 2011. Tools that have been created that will allow the organization to better manage the business in the long-term and drive profit maximization include:

1. By-product item process flow model.
2. New business development portfolio model.
3. Return per sow model.

A snapshot of the by-product item process flow model is depicted in Figure 4.2. The goal of the model is to understand for each of the by-product items harvested what the primary, secondary and in some cases tertiary channels of sale are. In addition, the model

allows those that manage the business to understand the prices that can be obtained in each of these channels as well as year to date (YTD) volumes sold by each channel. Prices are not reported in Figure 2 due to confidentiality. From the information identified in the chart, an optimization model can be created that allows the organization to change inputs as they continue to grow. Ultimately the model provides as understanding of the industries that provide the greatest profitability for each individual item. By understanding this information, the greatest profit per sow can be generated.

**Figure 4.2: Johnsonville Sausage By-Product Item Process Flow Model**

Drop Credit Value Streams		Volume (lbs)	Sales Credit Value Streams		Volume (lbs)
Hash gut w/3% Sodium Bisulphite	• Pharmaceutical/Medical • Rendering	4,740,280 808,015	Sparerib 5/up 30# Frozen	• Human Consumption • Rendering	3,779,100 2,353,226
Ears	• Pet Food • Rendering	576,040 37,193	Back Rib 2 1/4 Loin 30# Frozen	• Human Consumption • Rendering	1,920,360 1,583,826
Bones	• Pet Food • Rendering	1,065,930 1,854,225	Center Cut Ribs Layer 50# Frozen	• Human Consumption • Rendering	1,490,000 2,802,628
Pancreas	• Pharmaceutical/Medical • Rendering	267,283 24,733	Back Rib Special Cut 30# Frozen	• Human Consumption • Rendering	709,890 1,626,234
Stomach Lining	• Pharmaceutical/Medical • Rendering	267,550 24,466	Sparerib 5/up 30# Fresh	• Human Consumption • Rendering	517,260 5,615,066
Pericardia	• Pharmaceutical/Medical • Rendering	5,442 286,574	Back Rib Combo Fresh	• Human Consumption • Rendering	537,534 2,966,652
Small Intestine	• Pharmaceutical/Medical • Rendering	90,664 493,367	Back Rib Special Cut Combo Fresh	• Human Consumption • Rendering	177,160 332,7026
Fetal Pigs	• Research/Education • Rendering	73,152 452,476	Back Rib Pieces Frozen	• Human Consumption • Rendering	1,950 582,081
Snouts	• Pet Food • Rendering	100,550 51,298	Sparerib 5/up Combo Fresh	• Human Consumption • Rendering	208,631 5,923,695
Uteri	• Human Consumption • Rendering	0 876,047	Sparerib 5/up 30# Frozen	• Human Consumption • Rendering	3,779,100 2,353,226

The new business development portfolio model shows active, inactive, terminated and completed projects that Johnsonville Sausage is or has evaluated concerning the viability related to sow by-product items (Table 4.1) The goal of the model is to provide a tool for prioritization of new business initiatives by industry that are active as well as track



those initiatives that are inactive, terminated and completed status. This serves as the roadmap for resource alignment and the work to be completed to maximize profitability. The industries are split into tier 1, tier 2 and tier 3 industries with tier 1 having the most opportunity from a financial perspective and tier 3 the least based on the learning the organization has gained to date. Enabler projects are those that facilitate entrance into the various industries at a faster than normal pace.

**Table 4.1: New Business Development Portfolio Model**

<b>Traditional Channel (Tier 1)</b>			
<b>Project</b>	<b>Status</b>	<b>Expected Value</b>	<b>Implementation</b>
<b>Pet Food Channel (Tier 1)</b>			
<b>Project</b>	<b>Status</b>	<b>Expected Value</b>	<b>Implementation</b>
<b>Pharmaceutical/medical Channel (Tier 1)</b>			
<b>Project</b>	<b>Status</b>	<b>Expected Value</b>	<b>Implementation</b>
<b>Zoological Channel (Tier 2)</b>			
<b>Project</b>	<b>Status</b>	<b>Expected Value</b>	<b>Implementation</b>
<b>International/Foodservice/Retail Channel (Tier 2)</b>			
<b>Project</b>	<b>Status</b>	<b>Expected Value</b>	<b>Implementation</b>
<b>Supplement/Vitamin/Nutraceutical Channel (Tier 3)</b>			
<b>Project</b>	<b>Status</b>	<b>Expected Value</b>	<b>Implementation</b>
<b>Animal Health (Tier 3)</b>			
<b>Project</b>	<b>Status</b>	<b>Expected Value</b>	<b>Implementation</b>
<b>Bio-fuels (Tier 3)</b>			
<b>Project</b>	<b>Status</b>	<b>Expected Value</b>	<b>Implementation</b>
<b>Enabler Projects</b>			
<b>Project</b>	<b>Status</b>	<b>Expected Value</b>	<b>Implementation</b>
<i>* Footnote: projects are not reported due to confidentiality</i>			

Lastly, the return per sow model depicted in Table 4.2 was created to better understand the initial investment per animal and the dollars being returned based on batter, sales credits and drop credits. Batter is used by Johnsonville Sausage to produce its fresh finished product. Sales credits consist of whole muscle meats such as ribs, loins, tenderloins and hams that are sold to a human consumption market for further processing. Drop credits are cross-functional and consist of harvested items that are sold to industries

such as pet food, pharmaceutical and medical, research and education, commercial fishing and rendering. These items are typically not for human consumption. The model shows that using a sow purchase price of \$288.23, the average value of a sow in 2010, the value the organization obtains from batter, sales credits and drop credits is \$393.23. In essence, the total business is delivering back approximately 1 1/3 times the initial cost of the animal. As the items and value streams are optimized, the model will help the organization define profit maximization on the initial investment.

These tools provide a starting point for Johnsonville Sausage to better understand the dynamics of their by-product business today. As the business evolves as far as harvested items and entrance into new industries, they provide a good foundation in conjunction with optimization models to ensure that the organization is maximizing profitability within this segment of the business and delivering the highest return per sow.

**Table 4.2: Return Per Sow Model**

<u>Item</u>	<u>Weight (lbs/head)</u>	<u>Return on Investment (\$)</u>
Total Sow	505.67	
Batter	276.32	\$290.14
<u>Sales Credits</u>		
Boneless Pork Loin Combo	20.00	
Pork Tenderloin Combo	5.00	
Sirloin Hip Combo	5.00	
Chopped Ham	10.00	
Back Rib 30# Fresh	6.00	
5/Up Sparerib 30# Frozen	10.50	\$58.84
<u>Drop Credits</u>		
Heart	1.50	
Liver	5.00	
Tongue	1.10	
Heart Valve	0.10	
Thyroid	0.12	
Pancreas	0.50	
Hash/Gut	9.50	
Stomach Lining	0.50	
Snout	0.26	
Ears	1.05	
Placenta	1.00	
Eyeballs	0.10	
Ovaries	0.10	
Feet	6.00	
Kidneys	1.00	
Small Intestine	1.00	
Bones	5.00	
Fetal Pigs	1.80	
Blood	16.00	
Hides	42.50	
Stomachs	1.70	
Pericardia	0.50	
Bones and Gut Set	106.76	\$44.26
Total Return Per Sow		\$393.23

## **CHAPTER V: PROFIT MAXIMIZATION METHODOLOGY**

### **5.1 Overview**

The methodology section of this thesis will focus on three key concepts. The first is a descriptive method. Using results from an internal survey that was conducted with members within Johnsonville Sausage, a strategy canvas that compares our organization to the competition within the by-product industry will be created. The other two methods fall into the category of operations research tools. These methods focus on developing an optimization model and using Net Present Value (NPV) analyses.

A survey is a collection of information derived from responses to questionnaires or interviews. The information collected can be used for a number of purposes, including but not limited to: defining trends, understanding the competitive landscape both internally and externally, consumer appeal and satisfaction and brand image. Mathematical programming (MP), otherwise known as optimization, is a field of management science that finds the optimal or most efficient way of using limited resources to achieve the objectives of an individual or a business. Optimization models can be used in various applications such as determining product mix, manufacturing, routing and logistics, and financial planning. There are three key elements to an optimization model: decisions, constraints and an objective. The goal of an optimization model is to find the values of the decision variables that optimize the objective function without violating any of the constraints. Net Present Value is the difference between the present value (PV) of the future cash flows from an investment and the amount of investment. A zero NPV means that the original investment plus the required rate of return has been repaid on the project. A positive NPV means a higher return than the required return has been achieved. A negative NPV means a lower

than required return has been achieved. Net present value and internal rate of return (IRR) are the two discounted cash flow (DCF) techniques used to compare investment proposals.

There are three key features of the NPV rule. First, a dollar today is worth more than a dollar tomorrow. Second, NPV depends solely on the forecasted cash flows from the project and the forecasted opportunity cost of capital. Lastly, because present values are all measured in today's dollars, you can add them up. Typically organizations should invest in all projects with a positive NPV and reject those with a negative NPV. If capital within an organization is limited this may not be feasible. In this situation, the organization should calculate each project's profitability index, which is the project's NPV per dollar of investment. Once this is done, the organization should then pick the projects with the highest profitability indexes until capital funding runs out.

## **5.2 Methodology Objective**

The objective to be accomplished in this thesis is to create an optimization model to drive profit maximization for sows that are slaughtered in the fresh sausage production process within Johnsonville Sausage. The optimization model provides results that allow the organization to evaluate both existing and new by-product items and determine those industries that deliver the greatest profit maximization for the item(s) as well as the overall by-product business. By understanding this detail, Johnsonville Sausage will be able to maximize the return per sow.

Results from the optimization model are used to analyze the NPV in multiple industries as Johnsonville Sausage looks to make investments related to new business development within those industries. Net present value analysis allows the organization to

better understand wealth maximization opportunities above and beyond the base business of by-product sales. The investment(s) being evaluated allow additional vertical integration with the customer and the product perhaps changing the processes and parties that have typically used. By optimizing and streamlining the processes there are greater wealth maximization opportunities for Johnsonville Sausage that should translate into greater return per sow.

### **5.3 Data Collection**

Data for the strategy canvas evaluating Johnsonville Sausage internally as well as comparing Johnsonville Sausage to the competition within the by-product industry were collected through an internal survey. The internal survey was conducted in two parts. In the first part, participants evaluated Johnsonville Sausage's by-product business today against seven categories (Appendix A). In the second part, participants ranked Johnsonville Sausage against three competitors within the by-product industry using the same categories. The survey was conducted with 20 individuals that comprised the Procurement, By-product Sales and Plant Operations Teams within Johnsonville Sausage. Data outside the organization were not accessible. Participants ranked Johnsonville Sausage's by-product business in the critical factors of quality, customer service, profitability, innovation, availability, price variability and customer relationships. A ranking scale of 0-10 was used with 0 being worst in class and 10 best in class.

Data for the optimization model were obtained from Johnsonville Sausage's business management systems. Specifically, the data were taken from the Slaughter Sales Analysis report and Secondary Sales Volume Projection report. Table 5.1 provides a

sample Slaughter Sales Analysis report and Table 5.2 depicts a sample Secondary Sales Volume report.

**Table 5.1: Sample Slaughter Sales Analysis Report**

<u>Sales Credits</u>	<u>YTD Net Volume Sold (lbs)</u>
Center Cut Ribs	1,541,900
Brisket Bones	685,860
Back Ribs	537,534
Stomach	334,380
Back Ribs Special Cut	894,160
Spareribs 5/Up	4,583,291
Back Rib Pieces	173,760
Loins Boneless	5,869,503
Sirloin Hips	1,255,664
Chopped Ham	1,000,595
Loins Denuded Boneless	960,161
Tenderloins Denuded	142,505
Tenderloins	562,577
Bellies	1,004
<u>Drop Credits</u>	
Hash Gut 3% Sodium Bisulphite	4,740,280
Bones	1,065,930
Ears	576,040
Stomach Lining	267,550
Pancreas	267,283
Snouts	100,550
Small Intestine	90,664
Fetal Pigs	73,152
Feet	122,100
Placenta	34,650
Thyroid	23,450
Pericardia	5,442
Heart Valve	4,839
Kidney	30
Liver	3,011,200
Tongue	760,950
Heart	620,250
Bones, Gut Set, Inedible Fat	83,336,730
Hides 45#	19,315,395
Hides 40#	7,591,600
Blood, Rendering	4,773,980
<b>Total</b>	<b>147,412,472</b>



**Table 5.2: Sample Secondary Sales Volume Report**

<b>Item</b>	<b>Targeted Lbs/Head</b>	<b>Projected 2010 Volume (lbs)</b>	<b>Projected 2011 Volume (lbs)</b>	<b>Projected 2012 Volume (lbs)</b>	<b>Projected 2013 Volume (lbs)</b>
<b>Drop Credits</b>					
Hearts	1.50	876,047	902,328	929,397	957,279
Livers	5.00	2,920,155	3,007,760	3,097,990	3,190,930
Tongues	1.10	642,434	661,707	681,558	702,005
Heart Valve	0.10	58,403	60,155	61,960	63,819
Thyroid	0.12	70,084	72,186	74,352	76,582
Pancreas	0.50	292,016	300,776	309,799	319,093
Hash/Gut	9.50	5,548,295	5,714,744	5,886,181	6,062,767
Stomach Linings	0.50	292,016	300,776	309,799	319,093
Snouts	0.26	151,848	156,404	161,095	165,928
Ears	1.05	613,233	631,630	650,578	670,095
Placenta	1.00	584,031	601,552	619,598	638,186
Ovaries	0.10	58,403	60,155	61,960	63,819
Eyeballs	0.10	58,403	60,155	61,960	63,819
Feet	6.00	3,504,186	3,609,312	3,717,588	3,829,116
Kidneys	1.00	584,031	601,552	619,598	638,186
Stomachs	1.70	992,853	1,022,638	1,053,317	1,084,916
Blood	16.00	9,344,496	9,624,832	9,913,568	10,210,976
Fetal Pigs	1.80	1,051,256	1,082,794	1,115,276	1,148,735
Small Intestine	1.00	584,031	601,552	619,598	638,186
Pork Bones Edible	5.00	2,920,155	3,007,760	3,097,990	3,190,930
Pork Uteri	1.50	876,047	902,328	929,397	957,279
Pericardia	0.50	292,016	300,776	309,799	319,093
<b>Sales Credits</b>					
5/Up Fresh Rib	10.50	6,132,326	6,316,296	6,505,779	6,700,953
5/Up Frozen Rib	10.50	6,132,326	6,316,296	6,505,779	6,700,953
Back Rib - Boxed	6.00	3,504,186	3,609,312	3,717,588	3,829,116
Back Rib - Combo	6.00	3,504,186	3,609,312	3,717,588	3,829,116
Back Rib/Upgrade	5.00	2,920,155	3,007,760	3,097,990	3,190,930
Back Rib/Piece	1.00	584,031	601,552	619,598	638,186
Back Rib/Special Cut - Fresh Combo	4.00	2,336,124	2,406,208	2,478,392	2,552,744
5/Up Spare Rib - Frozen Combo	10.50	6,132,326	6,316,296	6,505,779	6,700,953
CC Ribs - 50# Box	7.35	4,292,628	4,421,407	4,554,045	4,690,667
CC Ribs - 30# Box	7.35	4,292,628	4,421,407	4,554,045	4,690,667
Brisket Bones	3.15	1,839,698	1,894,889	1,951,734	2,010,286
Tenderloins - Boxed	5.00	2,920,155	3,007,760	3,097,990	3,190,930
Tenderloins - Export	5.00	2,920,155	3,007,760	3,097,990	3,190,930
Tenderloins - Denuded	3.00	1,752,093	1,804,656	1,858,794	1,914,558
Loin - Rose Packing	20.00	11,680,620	12,031,040	12,391,960	12,763,720
Loin - Denuded and Frozen	12.00	7,008,372	7,218,624	7,435,176	7,658,232
Loin - Denuded and Fresh	12.00	7,008,372	7,218,624	7,435,176	7,658,232
Loin - Boneless/Skinless and Frozen	12.00	7,008,372	7,218,624	7,435,176	7,658,232
Ham - Oscar Mayer	25.00	14,600,775	15,038,800	15,489,950	15,954,650
Ham Knuckles	4.00	2,336,124	2,406,208	2,478,392	2,552,744
Whole Ham Muscle	10.00	5,840,310	6,015,520	6,195,980	6,381,860
Sirloins	5.00	2,920,155	3,007,760	3,097,990	3,190,930
Pork Bellies - Fresh	15.00	8,760,465	9,023,280	9,293,970	9,572,790
Tenderloins CW - Fresh Combo	5.00	2,920,155	3,007,760	3,097,990	3,190,930

Data in the Slaughter Sales Analysis report (Table 5.1) represent a one year picture in time. The Secondary Sales Volume report (Table 5.2) depicts the projected volume for a four year period from 2010 to 2013 using the projected head to be slaughtered during those years and the average lb/head that each item delivers from a sow.

The Slaughter Sales Analysis report (Table 5.1) has been in existence since 2008 when Johnsonville Sausage converted to a new Enterprise Resource System (ERP) called Systems, Applications and Product in Data Processing (SAP). The report breaks down by by-product item the pounds sold, total dollars generated for those pounds and total dollars generated per hundred weight. Total dollars and dollars per hundred weight achieved were not reported because of confidentiality purposes. The data are available both in a monthly and year to date (YTD) format. As new by-product items are harvested and sold, they are added to the analysis report.

The Secondary Sales Volume report (Table 5.2) was created to better understand the availability of both existing and new items based on projected sows to be slaughtered in 2010 to 2013. By using both reports, Johnsonville Sausage has detailed information related to the volume of an item sold, the industries that each by-product item supports and gaps in potential sales. Ultimately, sales that end up in the waste stream decrease the overall return per sow.

Data for the NPV analyses are from Johnsonville Sausage's business management and financial systems, internal experts, external industry experts and potential customers. To conduct the analyses, the profitability potential of the project(s), the investment required

to initiate the project(s) and the level of return that the organization expects from the project(s) compared to other investment opportunities available to the ownership must be understood. Investment includes such items as capital, manufacturing labor and overhead, ingredients, packaging, transportation, outside storage and corporate support. Profitability will be driven by the selling price opportunity to the individual customer and/or industry.

#### **5.4 Optimization Model**

The optimization model was created to help Johnsonville Sausage understand the size of the lost profit opportunities for animals slaughtered and the items that were harvested and sold from those animals. The goal of the analysis is to create a base model or starting point for the by-product business. The model created was a reactive approach to understanding lost opportunities related to the by-product business. A future goal is to expand the model to create a more proactive approach to managing the by-product business within Johnsonville Sausage. To create the model, information was taken from the 2010 Slaughter Sales Analysis report (Table 5.1), 2010 Secondary Sales Volume report (Table 5.2) and the 2010 operating budget. These three documents provided key information in regards to animals slaughtered, item lbs per head, existing value streams, by-product item sales, volume sales, dollars per item, and variable and fixed overhead standards at manufacturing. Variable and fixed overhead standards at manufacturing were used instead of fully loaded overhead standards because Johnsonville Sausage still incurs corporate allocated standards at manufacturing regardless of whether the organization harvested by-products or not.

This information was used as a starting point because it was the best information the organization possessed on the by-product business. The items that were sold can be broken down into seven industries that include: batter for fresh sausage production, pet food, pharmaceutical and medical, research and education, human consumption, commercial fishing and rendering. The by-product items are aligned in two categories: drop credits and sales credits. Drop credits are those items that are sold primarily to inedible value streams such as pet food, pharmaceutical and medical, research and education, commercial fishing and rendering. Sales credits are those items that are sold primarily for edible value streams such as human consumption and batter.

To understand the total volume by item projected for 2010, the Secondary Sales Volume report (Table 5.2) was used. In this report, total volume was defined by taking the projected sows to be slaughtered for the year and multiplying that by the average pounds per head for each item. The average pound per head is information derived by weighing each individual item that is harvested. Animals to be slaughtered for 2010 is an actual number whereas animals slaughtered for 2011 to 2013 are projected numbers derived by the organization's Procurement Team based on the anticipated growth in the fresh sausage business. An objective function of maximizing profitability was created for the items that were harvested and sold during 2010. The goal was to create a base model that showed the organization the profit that could have been realized in the by-product business during 2010 compared to what actually was realized. In conjunction with this, the model allows for expansion as new items are added to understand the upside profitability associated with these additions.

Within the optimization model, there were three constraints. First, the sales of a particular item to the different industries are less than the demand except within the rendering and batter industries. Within Johnsonville Sausage's by-product business today, item(s) that are not sold to an alternate industry will either end up in rendering or back into the batter formulations. All drop credits and bone-in sales credits (back ribs, spareribs and center cut ribs) enter the rendering stream and all boneless sales credits (loins, tenderloins, hams, sirloin hips and bellies) enter the batter stream. This process creates unconstrained demand for rendering and batter. As an organization, approximately 30% of the harvested items have a consistent customer base and the other 70% goes to the waste stream (rendering) or in the case of whole muscle meats back into batter formulations. As the by-product business and optimization model evolves, it may make sense to place a restriction on the rendering stream as this is the least profitable segment of the business portfolio; however, it is the largest volume generator. Second, a restriction was placed to prevent negative sales. Within the optimization model, sales can only be zero or greater for an item and industry. Last, a restriction has been placed such that sales of an item are less than the availability of that item. Based on the history of the by-product business, the organization has more availability of item(s) than customer demand within the industries that it supports. The three restrictions placed upon the model were not binding. Based on how the business and the model is set up today, prices are consistent across industries and demand meets supply due to rendering and batter being unconstrained in the model. Ultimately, Johnsonville Sausage is not realizing its true profitability potential within their by-product business.

The optimization model is defined as follows:

$D_{ij}$  = demand for item  $i$  from industry  $j$ , where...

$i = 1$  to 46 (blood, ears, snouts, bones, ovaries, etc...) and

$j = 1$  to 7 (rendering, pet industry, batter, commercial fishing, etc..)

$P_{ij}$  = price for item  $i$  paid by industry  $j$ , where...

$i = 1$  to 46 (blood, ears, snouts, bones, ovaries, etc...) and

$j = 1$  to 7 (rendering, pet industry, batter, commercial fishing, etc..)

$C_i$  = total annual cost of item  $i$ , where...

$i = 1$  to 46 (blood, ears, snouts, bones, ovaries, etc...) and

$C_i$  = variable overhead (VOH) + fixed overhead (FOH) at  
manufacturing

$A_i$  = total value stream supply available for item  $i$ , where...

$i = 1$  to 46 (blood, ears, snouts, bones, ovaries, etc...)

Decision variables that Johnsonville Sausage can control or change (under the assumed restrictions) are the pounds of each item that is sold to the various industries ( $X_{ij}$ ).

$X_{ij}$  = amount of item  $i$  sold to industry  $j$ , where...

$i = 1$  to 46 (blood, ears, snouts, bones, ovaries, etc...) and

$j = 1$  to 7 (rendering, pet industry, batter, commercial fishing, etc..)

Constraints are limitations or restrictions that apply to the process or system.

$$\sum_{j=1}^7 X_{ij} \leq A_i \text{ (items sold for item } i \text{ must be } < \text{ total available)...}$$

for all  $i$  items

$$X_{ij} \leq D_{ij} \text{ (amount of item } i \text{ sold to industry } j \text{ must be } < \text{ associated}$$

demand)...

for all i items and

for industries j = 2 to 5, 7 (does not apply to rendering or batter)

$X_{ij} \geq 0$  (cannot sell or distribute a negative quantity of any item to any industry)...

for all i items and all j industries

The objective function is to maximize the total value stream (under the given assumptions and restrictions). The value is defined as total revenue from the by-product stream minus variable costs and fixed overhead standards at manufacturing.

$$\text{Maximize Value} \quad \sum_{j=1}^7 \sum_{i=1}^{46} P_{ij} X_{ij} - \sum_{i=1}^{46} C_i$$

Ultimately, the optimization model validates what the organization has informally believed, Johnsonville Sausage should sell as much as possible at the highest price. This aligns with the goal the organization has for this initiative.

Today, within the dynamics of our existing by-product business, the optimization model is telling the organization that it should have generated approximately 54% more in profit for fiscal year 2010. To put this value in perspective, it is approximately two times the revenue actually generated within the business. In the long-term, as the by-product business in Johnsonville Sausage evolves and grows, the optimization model will be changed to provide guidance around both existing and new items and industries. The result of these endeavors will be profit maximization of the sow and ultimately increased profitability for Johnsonville Sausage.

## 5.5 Net Present Value Model

A net present value model (NPV) is used to define value optimization opportunities primarily driven by new business development initiatives. The NPV model that is used is:

$$NPV = PV - \text{Required Investment}$$

The active project portfolio for the by-product business consists of multiple projects to be evaluated for profit maximization opportunities. For the purposes of the thesis focus will be on one of these projects. The project considered is a restructured loin patty offering for the international, foodservice and retail markets. A positive NPV value will have to provide a minimum of 18% return to be considered a viable project. In some instances, however, based on the level of investment in the project, the risk associated with the project and the return on the organizational capital plan at the point in time in question, Johnsonville Sausage may increase the minimum hurdle.



## **CHAPTER VI: RESULTS**

### **6.1 Overview**

The results can be broken down into three primary channels. First, was the work that focused on customer value creation. From this work, Johnsonville Sausage was able to understand the critical factors associated with customer value creation, how they compared to their competition and the work to be conducted to achieve that value. Second, an optimization model for Johnsonville Sausage's by-product business was constructed to allow the organization to understand the actual profitability achieved within the business in 2010 compared to the profitability that could have been achieved. Lastly, was the focus on creating new products and processes within the by-product business with the goal of increased value for the items harvested thus increasing overall profitability for Johnsonville Sausage.

### **6.2. Customer Value Creation**

With input from Procurement, By-product Sales and Plant Operations within Johnsonville Sausage, the critical factors that define the most value for the customers within the by-product business were defined. They include:

- Profitability
- Availability
- Price variability
- Customer Service
- Quality
- Innovation

- Customer relationships

Profitability is the number one factor. In the by-product industry, profitability for the customer and the supplier is of utmost importance. The industry operates in a commodity market environment. The customer wants the best cost possible to make the most profit for their organization. On the other side of the spectrum, the supplier wants the same. If the supplier cannot make a profit selling the by-product, then it only makes sense for them to put it back into the waste stream. The commodity market is such that the customer is doing business with the supplier that can provide them the most profitability. Suppliers that can provide a product that differentiates itself from the other suppliers or that is not readily available to the customer by other suppliers can circumvent this business model.

Price variability ranked second as far as value to the customer. Because profitability is so important, customers within the by-product industry want the lowest cost possible. Because by-product items are a commodity, the cost of an item will vary. The majority of customers like the price variability of the by-product market because it gives them flexibility to do business with the supplier that can achieve the lowest cost. This facilitates a great deal of game playing with the supplier, however, if you cannot meet the lowest cost, the customer moves to another supplier until that supplier is no longer viable for them. The model facilitates a lack of building customer relationships with the supplier because they are constantly churning the supplier for the least cost option.

Item availability ranked third on the list of customer value. Customers that buy Johnsonville Sausage's by-product items are looking for a steady source of items to support

the growth of their product base. Without steady availability of product, they run the risk of lost sales, not meeting growth hurdles, and decreased profitability. Customers align themselves with those suppliers that can guarantee volume requirements. There is still the gamesmanship of driving cost lower; however, they are willing to align with one supplier to meet the bulk of their volume needs. They may have a major supplier with a set price by item that fulfills the majority of their volume requirements and a number of smaller suppliers to meet volume needs above and beyond in the event that their business growth exceeds expectations. Typically, this additional volume is bought at a spot market price.

Customer service, quality and innovation ranked fourth, fifth and sixth on the list of customer value, respectively. Although they are critical aspects to the customer and expectations of the supplier, they are not as important. These three factors are areas that cannot be disregarded as they are still important factors in driving business with a customer. If a supplier does not get the product to the customer in time or provide it to them in a state that is acceptable, then there is a risk of losing the business. It is important that customer specifications and requirements are met to build confidence and trust with that customer. In addition, the customer is always looking for the supplier to bring innovative solutions and improvements to their offerings not only to facilitate growth in their product portfolio but also to continue to improve upon profitability. These three areas need to be a continued focal point for the supplier to ensure future success as well as that of the customer.

The last factor critical to creating customer value was customer relationships. This factor is a very important consideration for customers in the base business, however, not as

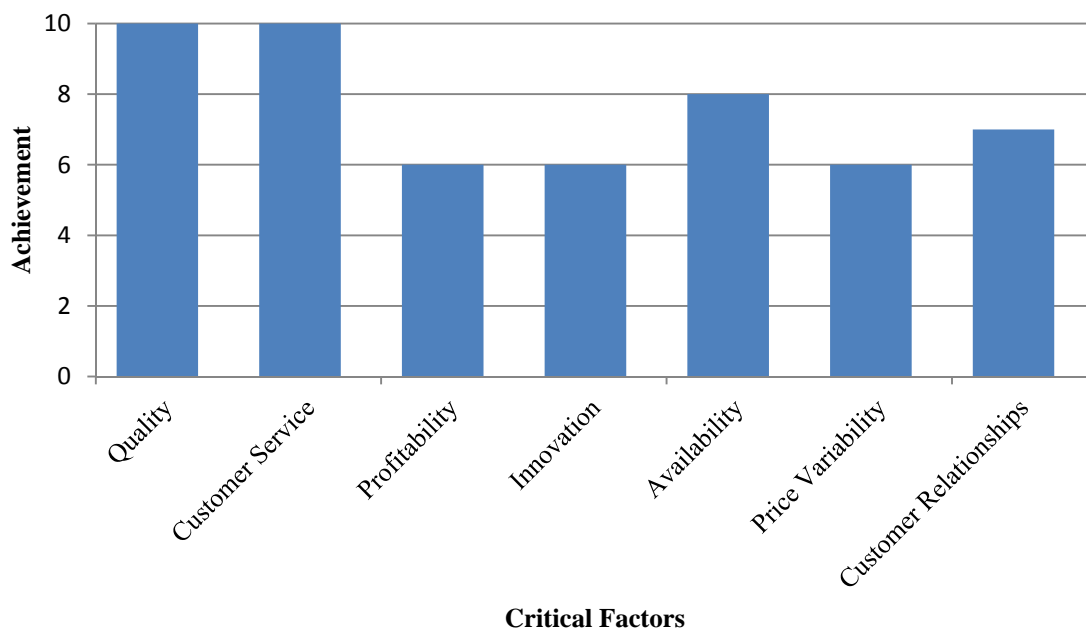
important to customers in the by-product business when compared to profitability, price variability and availability. Johnsonville Sausage does have a mix of customers today that buy based on the commodity market and lowest cost. The organization has a base of customers that value its reputation. This customer base is willing to accept a little higher cost to gain the trust, confidence and working relationships that Johnsonville Sausage has created a reputation for.

From the survey that was conducted on customer value creation within Johnsonville Sausage (Appendix A), strategy canvases were created. Figure 6.1 provides a strategy canvas for Johnsonville Sausage related to its by-product business. It illustrates how the organization ranks on a scale of zero to ten in the critical customer value factors of profitability, price variability, availability, customer service, quality, innovation and customer relationships. As the figure depicts the organization is above six in each of the critical success factors. Customer service and quality are the foundation of the organization and carries through to the by-product business as well. Putting out the best quality product available as well as meeting all of the customer needs regardless of the impact on the organization is key. Availability and customer relationships are also factors where this part of the business is doing well. The customers are confident that the product they are sourcing will be available to them at all times. In addition, customer relationships are an important part of the business philosophy, and are critical to how the day to day business is conducted.

The areas that require additional focus are profitability, price variability and innovation. As an organization, Johnsonville Sausage is not always the lowest cost option

for the customers. The business model has been to provide a premium offering. This has also carried through to the by-product business in a number of instances. The by-product business tends to be built such that prices are more stable and consistent instead of the variability that many customers desire. This model is not meeting the needs of the customer, and the overall value per sow is not optimized. There is still a large portion of the animal that goes to the waste stream. Johnsonville Sausage has the ability to innovate and create new products and channels to take advantage of these items and to drive additional value to existing and new customers. To accomplish this, the organization needs to be more focused on this end of our business.

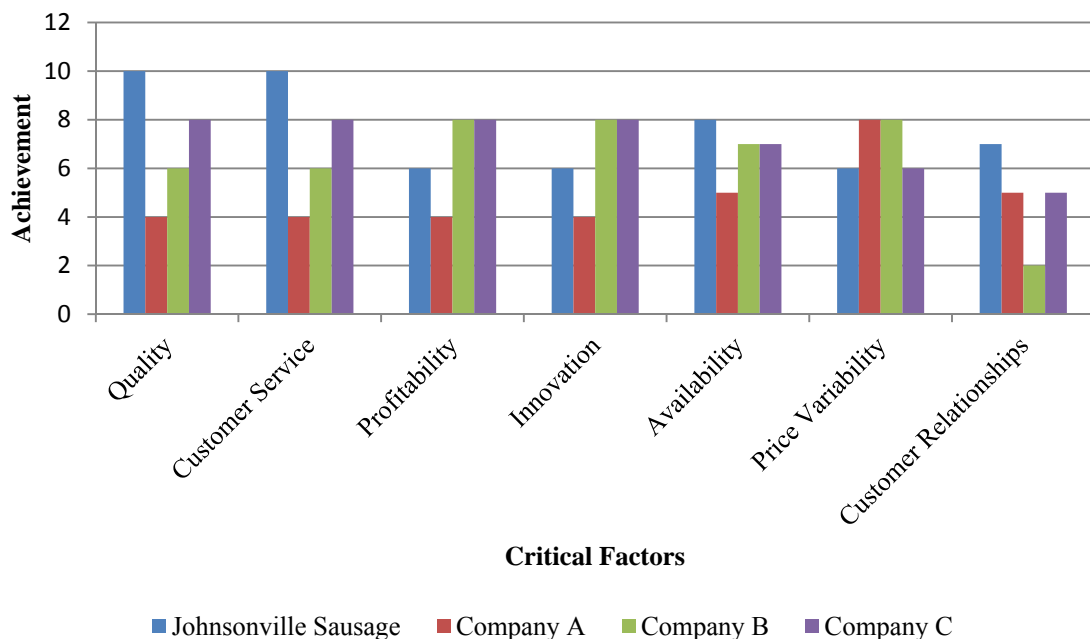
**Figure 6.1: Johnsonville Sausage Strategy Canvas for the By-Product Business**



**Achievement Axis – score of 0 = worst in class and score of 10 = best in class**

Figure 6.2 depicts a strategy canvas illustrating how Johnsonville Sausage compares to its top three competitors. Based on lack of industry data sharing, it is difficult to get a true picture of how the industry compares. The information depicted in the strategy canvas is based on perceptions from exposure to these organizations' philosophies and their business units. Johnsonville Sausage leads the way in customer service, quality and availability, and customer relationships compared to all three competitors. Profitability, price variability and innovation are areas that Johnsonville Sausage's competitors are higher in. These areas require additional focus and processes to create value for the customer as well as Johnsonville Sausage. Compared to the core business of sausage making, the application of these principles has not taken as strong a foothold.

**Figure 6.2: Strategy Canvas of Johnsonville Sausage versus the Competition for the By-Product Business**



**Achievement Axis – score of 0 = worst in class and score of 10 = best in class**

The strategy canvas comparing Johnsonville Sausage to its top three competitors clearly illustrates that to drive value innovation within the by-product business improvement is needed in profitability, innovation and price variability. The ERIC model (eliminate, reduce, increase, create) depicted in Figure 6.3 discusses key aspects of the business to facilitate resolution around the issue of value optimization for the harvested items. By using the ERIC model, the following can be evaluated:

- Undesirables to be completely eliminated.
- Low-value desirables to be reduced.
- High-value desirables to be increased.
- Non-existent desirables to be created.

**Figure 6.3: Johnsonville Sausage ERIC Model**

<p><b><u>Eliminate</u></b></p> <ul style="list-style-type: none"> <li>• Unprofitable customers and products</li> <li>• “Knowledge is Power” mentality</li> <li>• “Good Old Boy” network</li> </ul>	<p><b><u>Reduce</u></b></p> <ul style="list-style-type: none"> <li>• Waste stream</li> <li>• Manual systems</li> <li>• Reliance on base sausage business to drive profitability</li> <li>• Reliance on one sales individual to support the business and drive sales</li> </ul>
<p><b><u>Create</u></b></p> <ul style="list-style-type: none"> <li>• Business management tools and systems</li> <li>• Vision and strategy</li> <li>• Business development portfolio</li> <li>• Sales structure</li> <li>• Innovative solutions for by-product items</li> <li>• Contractual guidelines</li> </ul>	<p><b><u>Increase</u></b></p> <ul style="list-style-type: none"> <li>• Focus/priority by the organization</li> <li>• Communication on initiatives and opportunities</li> <li>• Education of the by-product business</li> <li>• Profitability per animal</li> <li>• Integration of “The Johnsonville Way”</li> </ul>

Using the ERIC model (Figure 6.3), the opportunities for elimination can be categorized into three key areas. First, is to eliminate unprofitable customers and products. Within the business, Johnsonville Sausage is focused on customer service. At times, this detracts from balancing the profitability of the customer with the profitability of the organization. Within the by-product end of the business, Johnsonville Sausage needs to do a better job of creating win/win solutions for the customer and the organization. If this cannot be achieved, then the organization should back away from the business and focus on those customers and products that create this type of solution.

Second, the ERIC model (Figure 6.3) shows that Johnsonville Sausage needs to eliminate the “knowledge is power” mentality within this portion of the business. Currently, there is one individual supporting the by-product business and holding all the knowledge associated with it. This philosophy limits the organization because others are not involved as far as ideas and solutions to make the processes and business as a whole more robust. In addition, Johnsonville Sausage is not developing individuals within the organization to support the by-product business long-term in the event that something happens to the individual that supports it today. The organization is not using the values and culture to the full extent within the by-product business as it has within the core business of sausage making.

Lastly, as depicted by the ERIC model (Figure 6.3), Johnsonville Sausage needs to eliminate “the good old boy” network. Both the by-product and procurement businesses are very male driven. There are a lot of long-term relationships that may cloud judgment when looking at new initiatives, changing customer base and channels, priorities and



profitability. The bulk of the business is conducted with a hand shake and lacks structure or written commitment both on the customer and organization ends. Johnsonville Sausage needs to build relationships with customers; however, they need to remain impartial enough to ensure that the best decisions for the organization are made.

As defined by the ERIC model (Figure 6.3), improvements within the organization's by-product business can be categorized into four key areas. First, the number of items that are entering into the waste stream needs to be reduced. Approximately 45% of every animal slaughtered is not being utilized in the manufacturing of fresh sausage making. Of this amount, 30% of these by-products have a consistent customer base today. The other 70% goes into rendering. The goal is to create a consistent customer base that takes advantage of all 45% of the by-product items per sow at the most optimized value. Second, as an organization, there needs to be a reduction in the reliance on manual systems within this end of the business. Today, there is a lot of knowledge and information that resides with one individual. The information and systems are very manual and are more reactive than proactive. Lastly, there is a need to reduce reliance on the core business for profitability. Today, the core business drives the profitability for the overall organization. This will likely always be the case as it is 90% of the business; however, the profitability of the by-product business can be improved by driving new volume, defining creative and innovative product offerings and expanding into new channels increasing the profit per sow compared to the present state. By doing this, the contribution level back to the organization can be increased, which reduces the reliance on the organization's base business.

High-value desirables within the ERIC model (Figure 6.3) that need to be increased can be classified into five key areas. First, is increased focus and priority by the organization on the by-product business. Johnsonville Sausage's core business is to make sausage. The reality, however, is that to make great sausage; the organization slaughters its own sows which leaves a by-product stream that cannot be used within the current product matrix. In the past, Johnsonville Sausage has been so focused on the core business that it has neglected understanding the potential profit foregone by not optimizing the value for those parts of the animal they sell to other channels or are not selling at all. With sow prices at an all time high, it is even more critical to focus and expend resources to derive as much value as possible to offset the initial investment of the animal and deliver more profitability for the organization. Today approximately 15% of the value of the sow can be attributed to by-product sales. Looking forward, the goal of Johnsonville Sausage would be to increase this to 45% within the next ten years through value added initiatives.

Second, all of our members need to be educated on this part of the business. Only 25% of the entire membership understands the by-product business from harvest through customer sale of the item(s). If individuals do not understand the process and how they can affect it, Johnsonville Sausage loses because it is unable to take advantage of their expertise and ideas for improvement. By "widening the circle of engagement" they are able to find the best and most profitable solution(s) for the organization. Third, the communication pipeline needs to be improved. This goes hand in hand with education. It is critical that all members of the organization understand the initiatives being worked on and progress towards those initiatives so they can affect it. Every member of the organization is

expected to be an entrepreneur and solution generator. If they do not understand the efforts that are going on within the by-products business, they are not able to affect it and make it more profitable for the customer and the organization.

Fourth, the organization needs to integrate “The Johnsonville Way” into the by-product business so that it is the foundation and the guiding principle for all actions that are undertaken with the expectation of all members involved in making a difference. As an organization, Johnsonville Sausage has been true to the philosophy within the core businesses; however, opportunities exist in the by-product business. Lastly, overall profitability within the business needs to be increased. By engaging in all aspects (eliminate, reduce, increase, create) of the ERIC model (Figure 6.3), the organization will flourish in overall profitability within the by-product business as well as the overall organization.

There are six areas that need to be addressed to provide the optimum solution for the issue that faces Johnsonville Sausage (Figure 6.3). First, new business management systems and tools that will effectively and proactively allow the organization to manage the business need to be created. One person cannot be relied on to possess the information, and the manual systems that support the business today. These methodologies and systems limit potential and cause Johnsonville Sausage to operate in a reactive mode. Second, the organization needs to define the vision and strategy for this part of the business. Today it is all about selling as much as possible at the best price to the customer. The business is just an offshoot of making fresh sausage. The focus and sense of urgency has not been emphasized or resourced to make this a thriving and contributing part of the organization’s

overall business portfolio. A vision and strategy need to be defined that will allow this business to drive value optimization, contribute back to the organization, leverage “The Johnsonville Way”, and support the overarching vision and strategy of the organization.

Third, the organization needs to address the existing sales structure. If Johnsonville Sausage is serious about the by-product business increasing profitability and sustainability then resources to support it need to be invested. One person cannot complete this task and be effective. A structure needs to be created and implemented that will not only allow for support of the existing customer base, but will also allow for new business development with other customers, new products and new channels. Fourth, this end of the business needs to operate with less of a handshake and with more structured customer guidelines and contracts. By doing this, the customers’ expectations are met and protected as well as the organizations.

Fifth, is the creation of more innovative solutions for both existing and new customers. Johnsonville Sausage prides itself on innovative solutions for its customers; however, within this part of the business that value is not always met. “The Johnsonville Way” needs to be leveraged in the by-product business very similar to what has been done in the core business. The membership needs to be as entrepreneurial in this area as they have been in the core business. To accomplish this education, communication and inclusion must increase. Lastly, a new business portfolio needs to be created. Johnsonville Sausage needs to expand its customer base into non-traditional industries. Expanding boundaries will allow the organization to look at new industries and products that will better optimize the value of the items that Johnsonville Sausage sells today, as well as those

that end up in the waste stream. By creating and implementing solutions to these six fundamental areas, the organization will make excellent progress towards the by-product business as well as create more value for their customers in the way of profitability, innovation and price variability.

To make changes to address this issue, it will be important to gain the support of the individuals involved in running the by-product business today as well as the leadership team within Johnsonville Sausage. A structured business plan including both tangible and intangible attributes will need to be created and approved. The tools created and personal learning achieved through working on this issue provide important details that will be critical to the validity of the issues raised and the solutions needed to improve the current business. To bring resolution to the issue identified, Johnsonville Sausage and its members must:

- Provide a good visual depiction of the issue.
- Ensure accurate and factual information is presented.
- Identify the benefits to the members and the organization.
- Poses a willingness to own and be accountable for issue resolution.
- Drive growth and development of the membership.

Ultimately this will create additional success for the customer, member and the overall organization.

### **6.3 Profit Maximization within the Existing By-product Business**

The results of the optimization model for the by-product business in 2010 indicate that Johnsonville Sausage achieved 46% of the overall profitability that could have been achieved with the restrictions that were placed upon it. This took into account the items sold, volume associated with each of those items and the variable and fixed overhead standards associated with the manufacture of those items during 2010.

In reviewing the results of the optimization model, it becomes clear that Johnsonville Sausage did not achieve profit maximization within its traditional by-product business during 2010. The profitability gap was driven specifically by the fact that the supply available within the by-product business was greater than customer demand. The drivers of this can be broken down into five areas. First, there is inconsistent demand within the existing customer base. The inconsistent demand was driven by economic conditions affecting customers' businesses and commodity conditions allowing customers to procure items at a more favorable cost. Second, there is a lack of resources within the by-product business to drive new business development for items that are not harvested within the business today as well as expansion into new industries. Third, there is an unclear vision and strategy as an organization related to the by-product business and creating value. Fourth, there is the priority and focus by Johnsonville Sausage related to the by-product business. The business has always been an offshoot of the primary business of making fresh sausage. With sow prices consistently increasing, the organization is starting to understand that value optimization opportunities exist that could be more profitable than sausage making. Lastly, inefficient business management tools and guidelines exist. Existing tools are not highly automated and not widely understood and

used. In addition, other tools are missing that would allow the business to be better managed. Company guidelines and expertise related to transportation, export, accounts receivable, labeling and regulatory, item set-up and information technology are geared towards Johnsonville Sausage's core business of sausage making and provide limitations within the management of the by-product business.

Product lines within the optimization model that could be expanded upon to increase profitability fall within both the sales and drop credit areas. Within sales credits, Johnsonville Sausage could expand its boneless whole muscle items such as loins, tenderloins, hams, sirloin hips and bellies. Within this same area, it could increase the sales of bone-in items such as back ribs, spareribs and center cut ribs. Looking at the drop credit area, the biggest opportunity is the expansion of the pharmaceutical and medical industry with increased sales of heart valves, small intestine, pericardia, ovaries, thyroids, eyeballs and pancreas. Table 6.1 depicts the upside profitability associated with these specific areas as defined by the optimization model.

**Table 6.1: Targeted By-Product Items Profit Maximization**

Item	Total Volume Available (lbs)	Actual Volume Sold (lbs)	Upside Volume (lbs)	Upside Profitability (%)
Loins	7,802,400	5,869,503	1,932,897	32.93
Tenderloins	3,251,000	520,058	2,730,942	80.96
Hams	6,502,000	1,000,595	5,501,405	81.81
Sirloin Hips	2,920,155	1,255,664	1,664,491	24.56
Bellies	8,760,465	1,004	8,759,461	99.99
Back Rib	3,504,186	1,920,360	1,583,826	17.52
Spare Rib	6,132,326	3,779,100	2,353,226	37.73
Center Cut Rib	4,292,628	1,490,000	2,802,628	46.84
Heart Valve	58,403	4,839	53,564	90.97
Small Intestine	584,031	90,664	493,367	81.62
Pericardia	292,016	5,442	286,574	98.10
Ovaries	58,403	10,000	48,403	79.34
Thyroid	70,084	23,450	46,634	49.71
Eyeball	58,403	10,000	48,403	79.34
Pancreas	292,016	267,283	24,733	9.25
Total				55.64



The results of the model validated what the organization already believed to be true which is that they are not maximizing return per sow. The results support the fact that the organization needs to drive changes within the existing process to maximize profit.

Johnsonville Sausage may accomplish this by:

1. Expand existing and new item sales within current industries which include pet food, pharmaceutical and medical, research and education, human consumption and commercial fishing.
2. Develop new products such as raw diets for the pet food industry, branded and/or private label restructured loin patty for the human consumption industry and wound patches for the medical industry.
3. Expand into new industries such as zoological, human health, bio-fuels and animal health in conjunction with the existing industries the organization supports today.

Long-term, as the by-product business within Johnsonville Sausage evolves and grows, the optimization model will evolve with it and provide guidance around both existing and new items and industries. Ultimately the base model will allow the organization to evaluate the value of new business opportunities compared to their existing business as it relates to upside profitability.

#### **6.4 Profit Maximization through New Products and Industries**

Within the new business development portfolio, there are a number of new opportunities that have been identified that diverge from the traditional by-product business that Johnsonville Sausage has supported throughout the years. In this thesis, one of those

initiatives was analyzed using net present value (NPV) to determine if there were more profitable opportunities than what the organization's base business was delivering. The project involved using sow loins to create a Johnsonville branded and/or private label restructured loin patty for the retail, foodservice and international markets. Within the traditional business today, the organization sells the whole sow loin to a further processor who then creates a finished product offering for either their branded or private label customers. The question I sought to answer was whether Johnsonville Sausage could accomplish the same by creating a more appealing product to the consumer while generating increased profitability for the organization?

The NPV analysis looked at installing a line within the existing Johnsonville Sausage manufacturing network to produce the restructured loin patty product. Using information from the Engineering and Facility Design Teams, a conceptual line model was created and costs were defined to install a line within the organization's fresh manufacturing facility. The cost associated with this initiative was an investment of \$2,200,000. The volume associated with the project was 3,000,000 pounds in the first year and was projected to grow annually by 5% so that seven-year volume was 4,020,287 pounds (Table 6.2). Based on the volume and selling price assumptions, the income the organization was projected to achieve over the seven year period was \$7,200,000 to \$9,648,689 (Table 6.2). Total expenses associated with the project over a seven year period ranged from \$6,408,784 to \$8,300,823 (Table 6.3). Cash expenses included direct labor, variable and fixed overhead at slaughter and processing, meat cost, ingredient cost, packaging materials, delivery and supply chain, sales and marketing, allocated corporate support and maintenance costs.

Using the information in the NPV analysis, the project achieved a NPV of \$580,459 (Table 6.3). Johnsonville Sausage utilizes internal rate of return (IRR) analysis instead of NPV analysis to make decisions. When using the same hurdle rate for the internal rate of return as for the NPV, conceptually the methods are equivalent. The positive NPV of \$580,459 achieved a hurdle rate of 26.5% which was above the minimum hurdle rate of 18%. Table 6.4 provides a visual depiction of the calculation of the IRR.

**Table 6.2: Restructured Pork Loin Patty Financial Statement**

	<u>Year 1</u>	<u>Year 2</u>	<u>Year 3</u>	<u>Year 4</u>	<u>Year 5</u>	<u>Year 6</u>	<u>Year 7</u>
Pounds Sold	3,000,000	3,150,000	3,307,500	3,472,875	3,646,519	3,828,845	4,020,287
Net Sales	\$7,200,000.00	\$ 7,560,000.00	\$7,938,000.00	\$ 8,334,900.00	\$ 8,751,645.00	\$ 9,189,227.25	\$ 9,648,688.61
Total Cost of Sales	\$5,331,163.51	\$ 5,765,441.22	\$ 5,831,269.48	\$ 5,951,534.97	\$ 6,114,428.45	\$ 6,366,906.03	\$ 6,631,870.36
Gross Profit (loss)	\$1,868,836.49	\$ 1,794,558.78	\$ 2,106,730.52	\$ 2,383,365.03	\$ 2,637,216.55	\$ 2,822,321.22	\$ 3,016,818.25
Sales, Delivery, Administration	\$1,350,000.00	\$ 1,417,500.00	\$1,488,375.00	\$ 1,562,793.75	\$ 1,640,933.44	\$ 1,722,980.11	\$ 1,809,129.11
Operating Margin (loss)	\$ 518,836.49	\$ 377,058.78	\$ 618,355.52	\$ 820,571.28	\$ 996,283.11	\$ 1,099,341.11	\$ 1,207,689.14
Common Expenses	\$ 42,000.00	\$ 44,100.00	\$ 46,305.00	\$ 48,620.25	\$ 51,051.26	\$ 53,603.83	\$ 56,284.02
Pre-tax Net Income (loss)	\$ 476,836.49	\$ 332,958.78	\$ 572,050.52	\$ 771,951.03	\$ 945,231.85	\$ 1,045,737.29	\$ 1,151,405.12

**Table 6.3: Restructured Pork Loin Patty Net Present Value (NPV) Analysis**

<b>Year</b>	<b>Investment</b>	<b>Income</b>	<b>Expense*</b>	<b>Depreciation</b>	<b>Net Income</b>	<b>Income Tax**</b>	<b>After Tax Cash Flow</b>
0	\$ (2,200,000)	\$ -	\$ -				\$ (2,200,000)
1	\$ -	\$ 7,200,000	\$ (6,408,784)	\$ (314,380)	\$ 476,836	\$ (190,735)	\$ 600,482
2	\$ -	\$ 7,560,000	\$ (6,688,261)	\$ (538,780)	\$ 332,959	\$ (133,184)	\$ 738,555
3	\$ -	\$ 7,938,000	\$ (6,981,169)	\$ (384,780)	\$ 572,051	\$ (228,820)	\$ 728,010
4	\$ -	\$ 8,334,900	\$ (7,288,169)	\$ (274,780)	\$ 771,951	\$ (308,780)	\$ 737,951
5	\$ -	\$ 8,751,645	\$ (7,609,953)	\$ (196,460)	\$ 945,232	\$ (378,093)	\$ 763,599
6	\$ -	\$ 9,189,227	\$ (7,947,250)	\$ (196,240)	\$ 1,045,737	\$ (418,295)	\$ 823,682
7	\$ -	\$ 9,648,689	\$ (8,300,823)	\$ (196,460)	\$ 1,151,405	\$ (460,562)	\$ 887,303
<b>Total NPV:</b>	\$ 580,458.91						

**Table 6.4: Restructured Pork Loin Patty Internal Rate of Return (IRR) Analysis**

<b>Year</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>
Revenue	7,200,000	7,560,000	7,938,000	8,334,900	8,751,645	9,189,227	9,648,689
<b>Total Revenue/Savings</b>	<b>7,200,000</b>	<b>7,560,000</b>	<b>7,938,000</b>	<b>8,334,900</b>	<b>8,751,645</b>	<b>9,189,227</b>	<b>9,648,689</b>
Operating Expense	6,408,784	6,688,261	6,981,169	7,288,169	7,609,953	7,947,250	8,300,823
Depreciation Expense	314,380	538,780	384,780	274,780	196,460	196,240	196,460
<b>Total Expense</b>	<b>6,723,164</b>	<b>7,227,041</b>	<b>7,365,949</b>	<b>7,562,949</b>	<b>7,806,413</b>	<b>8,143,490</b>	<b>8,497,283</b>
<b>Taxable Income / (Loss)</b>	476,836	332,959	572,051	771,951	945,232	1,045,737	1,151,405
<b>Taxes @ 40%</b>	190,735	133,184	228,820	308,780	378,093	418,295	460,562
<b>After Tax Income / (Loss)</b>	286,102	199,775	343,230	463,171	567,139	627,442	690,843
<b>Non Cashflow Items</b>							
Depreciation	314,380	538,780	384,780	274,780	196,460	196,240	196,460
Other							
<b>Total Non Cashflow Items</b>	314,380	538,780	384,780	274,780	196,460	196,240	196,460
<b>TOTAL CASHFLOW</b>	<b>600,482</b>	<b>738,555</b>	<b>728,010</b>	<b>737,951</b>	<b>763,599</b>	<b>823,682</b>	<b>887,303</b>
<b>TOTAL CAPITAL INVESTMENT:</b>			<b>2,200,000</b>				
<b>INTERNAL RATE OF RETURN:</b>			<b>26.5%</b>				

The volume assumptions in the NPV model were that volume in year one would be 3,000,000 pounds and grow 5% year over year for the next six years. To better understand the impact of volume on the model, a poor case, expected case and excellent case for volume growth was estimated for the project life. The poor case assumed flat growth, the expected case assumed 5% growth, and the excellent case assumed 10% growth year over year. Results of the analysis are depicted in Table 6.5. The expected growth in volume has an important effect on the profitability of the investment.

**Table 6.5: Net Present Value (NPV) Sensitivity Analysis**

	Poor Case	Expected Case	Excellent Case
Net Present Value	\$ (39,157.55)	\$ 580,458.91	\$ 1,297,307.08
Rate of Return	17.51%	26.46%	34.17%

A break even analysis on volume was also examined to understand the minimum volume that the project could support while still achieving the IRR hurdle rate of 18%. This analysis was also based on a 5% volume growth year over year during the seven year project life. Results of this analysis indicated that the minimum volume the project could support was 2,678,308 pounds. Achieving this volume and growing 5% each year over the next six years returned 18.0% on the project.

Looking only at the financials, the case could be made that Johnsonville Sausage should invest in the restructured loin patty project. The remaining concern is the level of risk the organization is willing to accept. On traditional sow loin sales, the organization is achieving approximately \$0.18/lb operating profit and has a consistent customer base with relationships that have been built over decades. With the restructured loin patty, there are not firm sales volume commitments from the retail, foodservice and international teams

within the organization. In addition, the market is not familiar to the product, and adequate customer testing has not been conducted to understand acceptability of the product profile and selling price being proposed. Understanding consumer appeal would need additional research and development and financial work to develop an acceptable finished product. Evaluating all aspects of the project, I would recommend that the organization not invest in the restructured loin patty project within their internal manufacturing network. Before more financial work is conducted, a sales and marketing business plan should be created. This would give Johnsonville Sausage the opportunity to learn more about the consumer appeal and acceptability, selling price acceptability, volume opportunity, sensory profile and performance and overall business sustainability before the organization takes the next step.



## **CHAPTER VII: CONCLUSIONS**

### **7.1 Overview**

The focus of the thesis was to optimize the value of the sows harvested by Johnsonville Sausage annually to achieve the greatest return per sow. Efforts to achieve this goal were focused on defining new channels, creating new products, and increasing the customer base and volume for those by-product items that are and are not consistently harvested today. To better understand profit maximization opportunities, two primary tools were utilized. These tools included the creation of an optimization model using 2010 financial information associated with Johnsonville Sausage's by-product business, and the development of a new business development portfolio from which net present value (NPV) analyses were conducted. Information learned from these tools will allow Johnsonville Sausage to make educated business decisions around future investments and profit maximization opportunities.

### **7.2 Future Studies**

Looking to the future with the optimization model, there are a number of changes that can be made to enhance the model and better understand as an organization the upside opportunity. First, the tool could be used to project future profit maximization based on projected animal growth, item and volume growth and price variation driven by commodity market changes and/or evolution of the new business development portfolio. Today the tool is more reactionary comparing the actual achieved to what could have been achieved. Second, the model could be modified to conduct break-even analyses based on investment. In essence if the organization has a new product or industry that it wishes to embark on that requires investment, Johnsonville Sausage could solve for the breakeven price they would

need to make that investment. Third, the model could be modified to take determine the level that Johnsonville Sausage would procure by-product items from other organizations, assuming a stronger customer base than their sow slaughter could accommodate, and the price Johnsonville Sausage could pay for those items and still enhance profit. Lastly, sensitivity analyses could be another dynamic added into the model to understand volatility in pricing for both the larger by-product items, rendering and batter.

After developing a more detailed sales and marketing business plan for the restructured pork loin patty, additional financial analysis will be needed to validate the profitability of investing in this business. The financial analyses should also compare a co-manufacturing option to an internal manufacturing option. This evaluation would provide Johnsonville Sausage with the most financially sound course of action as they embark on their new business. By doing this, the organization limits its risk level as it relates to investment and customer relationships, and in the long-term creates a more profitable business.

In looking at the new business development portfolio, there are two more NPV analyses that are currently being analyzed in conjunction with the restructured loin patty project. The first project creates a raw diet for the pet food and zoological industries. The assumption is that Johnsonville Sausage would absorb the slaughter volume within the existing network and that the organization would turn a third facility into a manufacturing site to support the pet food and zoological industries. The business would start with providing a raw diet to those industries and evolve into other offerings based on profitability. The second project focuses on investing in manufacturing capabilities at one

of the existing slaughter facilities to support the pharmaceutical and medical industries. This project would allow the organization to move out of the commodity by-product business and play a role in the finished product in these industries. By doing this, the organization will have the ability to create additional value within the manufacturing chain and ultimately increase profitability for Johnsonville Sausage.

As financial analyses are completed, it will be important to understand the financial aspects of the evaluation along with project risk level, capital investment limits annually, return on investment expectations, resource needs and constraints, and impact to brand image to make the best business decisions for Johnsonville Sausage long term.

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## APPENDIX A

### By-product Business Survey

The survey consists of two sections. In section one you will be evaluating Johnsonville Sausage's by-product business against seven critical factors of success. Each factor will be ranked on a 0-10 scale with zero being worst in class and ten being best in class. The information generated in this section will be utilized to create a strategy canvas for Johnsonville Sausage within their by-product business. In section two you will be evaluating Johnsonville Sausage's by-product business against their top three competitors (Company A, Company B, Company C). The evaluation will use the same seven critical factors of success and the ranking scale as indicated in section one. The information generated in this section will be utilized to create a strategy canvas comparing Johnsonville Sausage to its competition within the by-product industry.

#### Section 1

1. On a scale of 0-10, how would you rank Johnsonville Sausage's by-product business in the area of customer service?  
0    1    2    3    4    5    6    7    8    9    10
  
2. On a scale of 0-10, how would you rank Johnsonville Sausage's by-product business in the area of quality?  
0    1    2    3    4    5    6    7    8    9    10
  
3. On a scale of 0-10, how would you rank Johnsonville Sausage's by-product business in the area of profitability?  
0    1    2    3    4    5    6    7    8    9    10
  
4. On a scale of 0-10, how would you rank Johnsonville Sausage's by-product business in the area of innovation?  
0    1    2    3    4    5    6    7    8    9    10
  
5. On a scale of 0-10, how would you rank Johnsonville Sausage's by-product business in the area of availability?  
0    1    2    3    4    5    6    7    8    9    10
  
6. On a scale of 0-10, how would you rank Johnsonville Sausage's by-product business in the area of price variability?  
0    1    2    3    4    5    6    7    8    9    10

7. On a scale of 0-10, how would you rank Johnsonville Sausage's by-product business in the area of customer relationships?
- 0      1      2      3      4      5      6      7      8      9      10

**Section 2**

1. On a scale of 0-10, how would you rank the following competitors' by-product business in the area of customer service?

A	0	1	2	3	4	5	6	7	8	9	10
B	0	1	2	3	4	5	6	7	8	9	10
C	0	1	2	3	4	5	6	7	8	9	10

2. On a scale of 0-10, how would you rank the following competitors' by-product business in the area of quality?

A	0	1	2	3	4	5	6	7	8	9	10
B	0	1	2	3	4	5	6	7	8	9	10
C	0	1	2	3	4	5	6	7	8	9	10

3. On a scale of 0-10, how would you rank the following competitors' by-product business in the area of innovation?

A	0	1	2	3	4	5	6	7	8	9	10
B	0	1	2	3	4	5	6	7	8	9	10
C	0	1	2	3	4	5	6	7	8	9	10

4. On a scale of 0-10, how would you rank the following competitors' by-product business in the area of profitability?

A	0	1	2	3	4	5	6	7	8	9	10
B	0	1	2	3	4	5	6	7	8	9	10
C	0	1	2	3	4	5	6	7	8	9	10

5. On a scale of 0-10, how would you rank the following competitors' by-product business in the area of availability?

A    0    1    2    3    4    5    6    7    8    9    10

B    0    1    2    3    4    5    6    7    8    9    10

C    0    1    2    3    4    5    6    7    8    9    10

6. On a scale of 0-10, how would you rank the following competitors' by-product business in the area of price availability?

A    0    1    2    3    4    5    6    7    8    9    10

B    0    1    2    3    4    5    6    7    8    9    10

C    0    1    2    3    4    5    6    7    8    9    10

7. On a scale of 0-10, how would you rank the following competitors' by-product business in the area of customer relationships?

A    0    1    2    3    4    5    6    7    8    9    10

B    0    1    2    3    4    5    6    7    8    9    10

C    0    1    2    3    4    5    6    7    8    9    10