Analytical Network Process (ANP) Application

Ford Explorer Case

BQOM – Decision Making in a Complex Environment

SUMMER 2001

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by :

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1.EXECUTIVE SUMMARY

The Ford Explorer sports utility vehicle (SUV) has been a very popular brand in the US market for a long time. However in the last two years, several of accidents have occurred involving this motor vehicle. This lead the industry to review the safety features of the Explorer model, including the special tires for this specific model designed by Firestone. Both companies are not willing to take full responsibility of the accidents; therefore it leads to a conflict between Ford and Firestone. The conflict aside, the two companies have been trying to determine what will be the best solution to fix this problem.

The analysis in this paper focuses on determining the optimal decision for Ford Company regarding the Explorer/Firestone conflict. The Analytical Network Process (ANP) was applied to the problem.[1] There are four possible decision alternatives that Ford Motor Company can make. They are : to discontinue Explorer, to redesign the model, to maintain the current model, and to maintain the current model and change the tire supplier.

The analysis was done using the ANP in the Benefits, Costs and Risks (BCR) model. Each criterion has independent sub-criteria, and each sub-criterion contained a detail network.

The decision making process along with the utilization of ANP approach lead us to conclude that *redesigning the model* is the optimal alternative for Ford Motor Company.

2.THE ISSUE

In August 9, 2000 the companies Firestone and Ford announced a recall[2] of 6.5 million tires that contained a safety-relate defect. The recall was the result of an abnormal high rate of treads separations that caused catastrophic rollover crashes[3] that maimed and killed drivers and passengers. At that time, the companies' jointly had decided that Decatur was the appropriate focus for a recall of Wilderness AT tires, thus excluding millions of identical tires made in Firestone's Wilson, North Carolina and Joilette, Quebec, Canada plants.

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[1] We utilized the **Expert Choice** program to rate the Benefits, Costs and Risks.
[2] The recall included all 15-inch ATX II tires and those 15-inch Wilderness AT tires manufactured by Firestone plant in Decatur, Illinois.
[3] 148 deaths and 525 injuries by the end of year 2000

The tires had been sold as original equipment on Ford's Explorer SUV, and manufactured according to specifications from Ford.

In May 2001, Ford Motor Company also announced a new recall of 13 million tires from the Ford Explorer models and the termination of the business relationship with Firestone.

Ford Motor Company announced in March 2001 that the company would redesign the Explorer model (creating the new Explorer) adding a wider body and incorporating some "rollover" features.

There are several key players in the tire separation tread case. The first is the company that designed and manufactured the tires: Firestone. The second is the company that designed and manufactured the vehicles: Ford Motor Company. The third is the governmental regulation agency: the National Highway Safety Administration (NHTSA).

3.CREATING THE MODEL

The model for finding the optimal decision for Ford Motor Company regarding the Explorer/Firestone conflict was designed using a benefits, costs, and risks model. The benefits model will indicate the decision that gives the most benefit, whereas the risk and cost models indicate the decisions that are most costly and risky. Using the ANP program, the calculation of the formula is done automatically.

3.1. Alternatives

Discontinue Explorer production: Ford Motor Company will stop the Explorer model production.

Redesign the Explorer model: Ford Motor Company will continue producing the Explorer model but the company will redesign some parts of the Sport Utility Vehicles (SUV) in order to increase the safety level of the vehicle.

Maintain the production of Explorer Model: Ford Motor Company will keep on producing the Explorer model without any modifications.

Maintain the production of Explorer Model, but change the tire supplier: Ford Motor Company will keep on producing and commercializing the current Explorer model equipped with tires from a different supplier.

3.2. Cluster Definitions

Under the benefit, cost, and risk models, there are different clusters defined that interact with respect to the control hierarchy established. For benefits and risks, the control hierarchy consists of social and economic factors; while the cost control hierarchy includes social, economic, and political factors. Although the clusters and the specific elements assigned to each network vary due to their interactions, the following general definitions apply to all.

3.2.1. Alternative Decisions

The alternative decisions cluster includes the potential decisions for Ford Motor Company regarding the Ford/Firestone conflict. The potential decisions included are:

- Discontinue Explorer production.
- Redesign the Explorer model.
- Maintain the production of Explorer Model.
- Maintain the production of Explorer Model, but change the tire supplier.

3.2.2. Stakeholders

The stakeholders include people or groups that will be impacted by the alternative decisions made by Ford Motor Company. The elements in this cluster are the following :

- Customers : current and potential buyers
- Community : people who may not be a customer but could be affected by the alternative decisions
- Employees : Ford Motor Company employees, including labor and management
- Nation's Highway Safety Agency : government agency

3.2.3. Tire Suppliers

This cluster considers current and potential tire suppliers for Ford Motor Company. The elements in this cluster are the following : Firestone, Goodyear, Michelin, and Other Tire Suppliers.

3.2.4. Competition

The competition cluster includes other SUV brands and models owned by Ford Motor Company and other companies. The elements in this cluster are the following :

- Ford's other SUV brands (e.g. Escape)
- Ford affiliates' SUV brands (e.g. Land Rover)
- Other companies' SUV brands (e.g. GM, Honda, Lexus, Dodge, etc)

3.2.5. Public Relation

This cluster considers elements that will impact the company's relationships with the stakeholders. The elements in this cluster are the following :

- Image : the company's image in public
- Trust : reliability in the company's name
- Accountability : how the company react to community threats caused by Ford Motor Company's products
- Legal Matters : current and potential lawsuits filed against the company

3.2.6. Brand Image

The Brand Image cluster describes major aspects of the products that will impact the company's image. The elements in this cluster are the following :

Quality, Safety, Prestige, and Service.

3.2.7. Cost of Resources

The cost of resources refers to those costs that Ford Motor Company may incurred when choosing the alternative decisions. The elements in this cluster are the following :

- Layoff costs : the cost that the company will incurred in case they decide to reduce the number of employees.
- Launching costs : the cost that the company will incurred in case they decide to launch a new product.
- Write-off costs : the cost that the company will incurred in case they decide to reduce the inventory of discontinued products
- Production costs : the cost that the company incurs during the production stage

3.2.8. Resources

Resources cluster includes Revenues, Production Capacity, and Market Share.

3.3. Procedure

In order to rate the Benefits, Costs and Risks in the decision Ford Motor Company will have to make regarding the Ford Explorer Model, we used the Expert Choice software. We set the goal and 3 criteria: Domestic Issues, International Relations and Human Well-Being. In Domestic Issues, the sub criterion utilized was: a) Ford Motor Company's reputation, b) Car's Industry reputation and c) US Government's reputation. In the case of International Relations, the sub criterion used was: a) Relationship with customers in other countries, b) Relationship with suppliers in other countries and c) Relationship with other countries' governments. Finally, in the case of Human Well-Being, the sub criterion utilized was: a) Future Safety Factors,

b) Confidence in government agencies and c) Confidence in the Justice system.

The outcome of the rating process was the following:

Benefits	0.493
Costs	0.382
Risks	0.126

4. BENEFITS MODEL

Frequently, the alternatives from which a choice must be made in a decision-making situation have both benefits and costs associated with them. This is the case for the Ford Motor Company decision. Generally, benefits, costs and risks cannot be combined; they are opposing forces. Thus, in our model, it is useful to construct separate benefits, costs and risks hierarchies, with the same decision alternatives located on each.

Benefits in our model are gains and advantages from making a given decision, partitioned into two categories: economic and social. Economic benefits refer to a decision's positive effect on stakeholders, tire suppliers, competition and resources. Last, social benefits describe a decision's positive effect on stakeholders, tire suppliers, competition and resources.

4.1. Economic Benefits Clusters, Links and Judgments

The following table illustrates the clusters in this network and their respective elements:

Clusters	**Elements**
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Stakeholders	Customers, Community, Employees and NHSA.

Tires Suppliers	Firestone, Goodyear, Michelin and Other tire suppliers.
Competition	▪ Ford's other SUV brands ▪ Ford affiliates' SUV brands ▪ Other companies' SUV brands
Public Image	Image, Trust, Accountability and Legal matters.
Resources	Revenue, Production Capacity and Market Share.

The inner and outer dependencies of clusters in the economic benefits model are shown in Figure 4.1 and Figure 4.2**.**

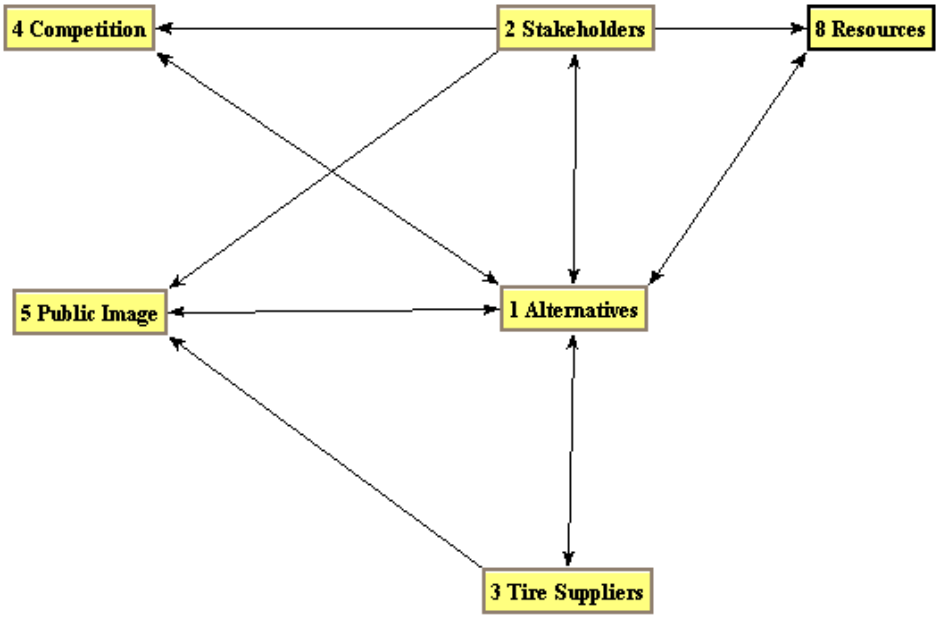

Figure 4.1 : Macro View of Economic Benefits Networks

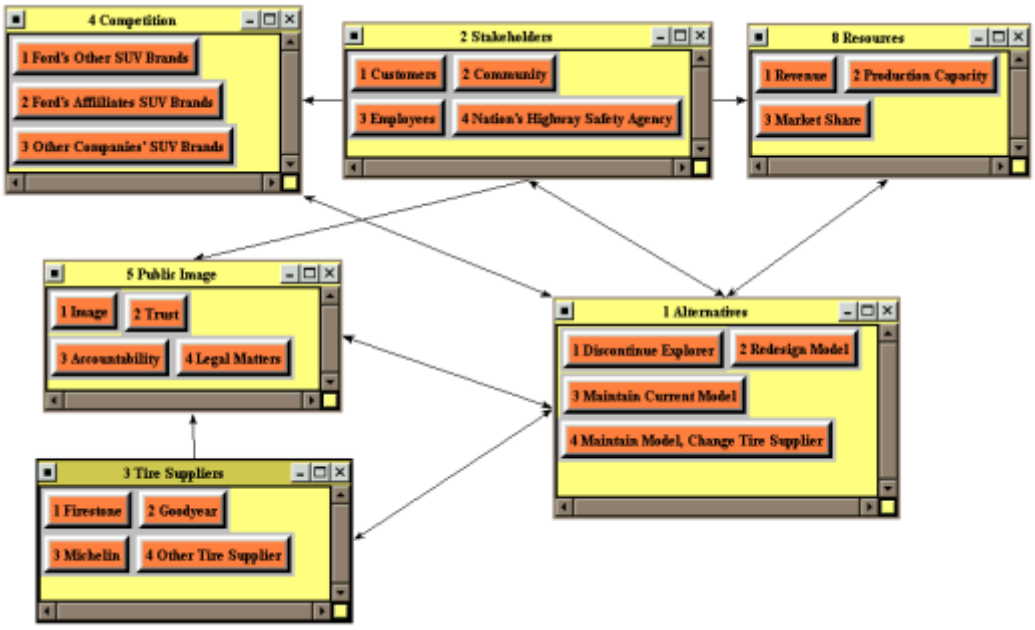

Figure 4.2 : Micro View of Economic Benefits Network

The ‘stakeholders’ cluster, obviously, refers to the people or group of people who could potentially benefit economically, based on different decision alternatives taken by Ford Motor Company. This cluster also affects ‘competition’ cluster, because the decisions made may drive the stakeholder to provide economic benefit to either one of the competitors. The ‘stakeholders’ cluster also affects the ‘resources’ cluster. The ‘resources’ cluster refers to the internal resources that the company has. For example, the company’s revenue will be impacted by some of the actions taken by the stakeholders.

The ‘tire suppliers’ cluster refers to tire companies that may gain economic benefit based on the decision alternatives taken by Ford. This cluster will also affect the ‘public image’ cluster; more specifically, the legal matters.

The ‘stakeholders’ and ‘tire suppliers’ clusters have more inter-links than the other clusters. This is due to the nature of the network, economic benefit, which usually has more impact on a person or a group of persons.
In this particular network, there is no inter-dependent in any of the clusters.

The table below shows the result from the Economic Benefit network.

Graphics	Alternatives	Priority	Ranking
	1 Discontinue Explorer	0.4806	1
	2 Redesign Model	0.1778	3
	3 Maintain Current Model	0.0596	4


4	0.2	2	
Maintain Model, Change Tire Supplier	820		

Table 4.1 : Final Result in Economic Benefits Network

4.2. Social Benefits Clusters, Links and Judgments

The following table illustrates the clusters in this network and their respective elements:

Clusters	Elements
Alternative Sites	▪ I
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Stakeholders	Customers, Community, Employees and NHSA.
Tires Suppliers	Firestone, Goodyear, Michelin and Other tire suppliers.
Competition	▪ Ford's other SUV brands ▪ Ford affiliates' SUV brands ▪ Other companies' SUV brands
Public Image	Image, Trust, Accountability and Legal matters.
Brand Image	Quality, Safety, Prestige, and Service

The inner and outer dependencies of clusters in the Social Benefits model are shown in Figure 4.3 and Figure 4.4**.**

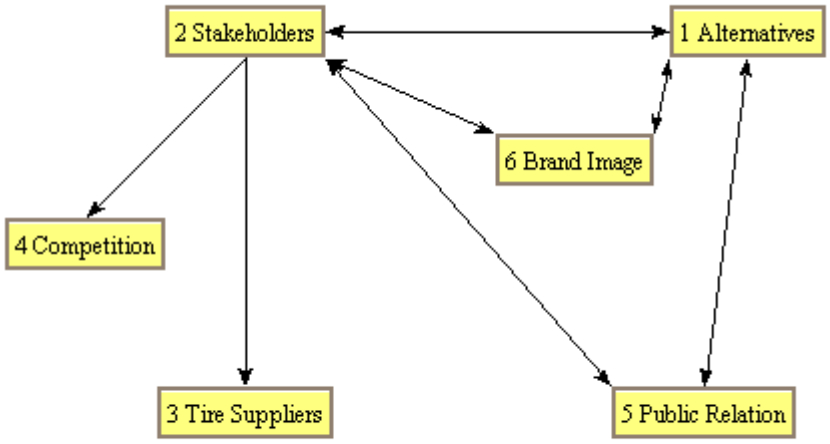

Figure 4.3 : Macro View of Social Benefits Networks

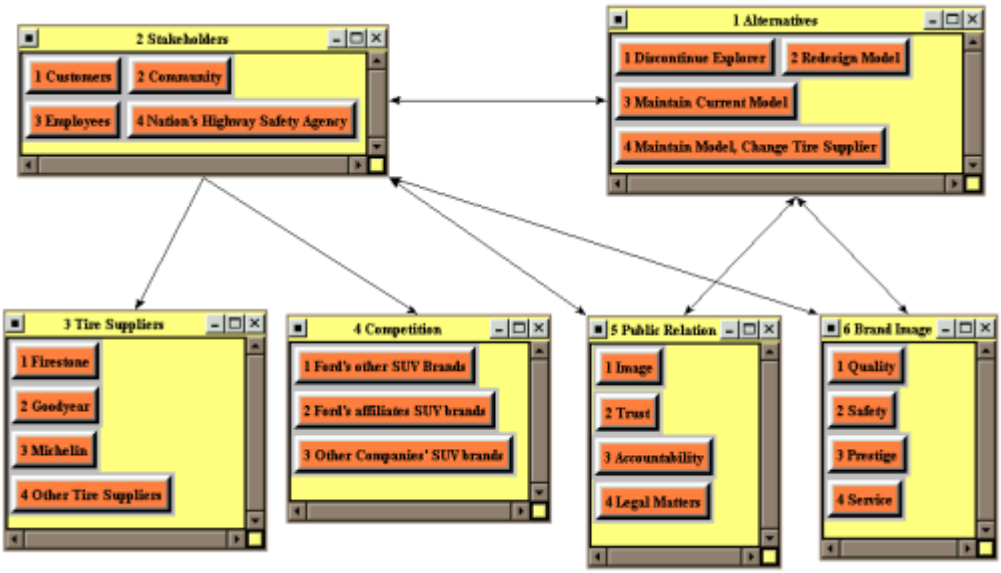

Figure 4.4 : Micro View of Social Benefits Network

The 'stakeholders' cluster, refers to the people or group of people who could potentially benefit socially, based on different decision alternatives taken by Ford Motor Company. There is a link between this cluster and 'tire suppliers' cluster. However, this link only reflects an equal importance amount the nodes in the 'tire suppliers' cluster. From stakeholder's point of view, there is no particular social benefit in choosing one tire supplier over the other.

The ‘stakeholders’ cluster also affects ‘competition’ cluster, because the decisions made may drive the stakeholder to provide social benefit to either one of the competitors.

The next cluster that is affected is the ‘public image’ cluster. The stakeholders can give social benefit based on the alternative decisions taken by Ford, and that will impact how they see the company’s public image in terms of trust, image, accountability, and legal matters.

The last cluster that is impacted is the ‘brand image’ itself. This requires no further explanation, as the alternative decisions taken will clearly have the power to change how stakeholders perceive the brand’s image. Different stakeholder may value different brand image, but overall, this cluster will be very much impacted by the stakeholders.

As you can see, the ‘stakeholders’ cluster plays a very important role in this network. And, as in the Economic Benefits network, there is no inter-dependent in any of the clusters in the Social Benefit network.

The following table summarizes the results from the Social Benefits network.

Graphics	Alternatives	Priority	Ranking
	1 Discontinue Explorer	0.5474	1
	2 Redesign Model	0.3246	2
	3 Maintain Current Model	0.0106	4
	4 Maintain Model, Change Tire Supplier	0.1174	3

Table 4.2 : Final Result in Social Benefits Network

4.3. Synthesis of Judgments in the Benefits Model

Both networks in the benefit have independent results that will then feed the higher-level network (the overall benefit network).

The combined results from Economic Benefit and Social Benefit networks can be seen in the following table :

Alternative	Economic Benefit Priority	Social Benefit Priority	Overall Priority	Overall Ranking
1. Discontinue Explorer	0.4806	0.5474	0.4939	1
2. Maintain Model, Change Tire Supplier	0.2820	0.1174	0.2491	2
3. Redesign Model	0.1778	0.3246	0.2071	3
4. Maintain Current Model	0.0596	0.0106	0.0498	4

Table 4.3 : Synthesize Judgments in the Benefit Model

This result indicates that from Benefit Model point of view, the alternative decision of discontinuing Explorer gives the highest benefit, both from economic and social standpoints.

This final result is mostly driven by the social benefit, which has the highest priority of 0.5474, in contrast with the economic benefit of 0.4806.

Another observation is that the overall priority for the first rank alternative, i.e. to discontinue Explorer, has significant difference than the next alternative. As seen from the table, the overall priority for alternative 'discontinue Explorer' has 0.4939 priority while the second best alternative, i.e. 'maintain model, change tire supplier', only has 0.2491 priority. The difference is almost twice as much, which shows how important the first rank alternative is compare to the other alternatives.

5. COSTS MODEL

The cost for Ford Motor Company of choosing one alternative over the others can be divided into economic, social and political costs, which comprise the control hierarchy for this model. Economic costs are costs in which a monetary value can be assigned such as the production and advertising costs involved on the redesign of the Ford Explorer. Social costs are defined as the expense to society in terms of a stakeholder exposure to decisions made regarding the Ford Explorer. Finally, political costs can be defined as the intangible costs due to a decision

taken, such as breaking relationship between Ford and its tire supplier.

5.1. Economic Costs Clusters, Links and Judgments

The following table illustrates the clusters in this network and their respective elements:

Clusters	Elements
Alternative Sites	▪ I
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Stakeholders	Customers, Community, Employees and NHSA.
Tires Suppliers	Firestone, Goodyear, Michelin and Other tire suppliers.
Competition	▪ Ford's other SUV brands ▪ Ford affiliates' SUV brands ▪ Other companies' SUV brands
Public Image	Image, Trust, Accountability and Legal matters.
Cost of Resources	Layoff Costs, Launching Costs, Writeoff Costs and Production Costs.
Resources	Revenue, Production Capacity and Market Share.

The inner and outer dependencies of clusters in the economic benefits model are shown in Figure 5.1 and Figure 5.2**.**

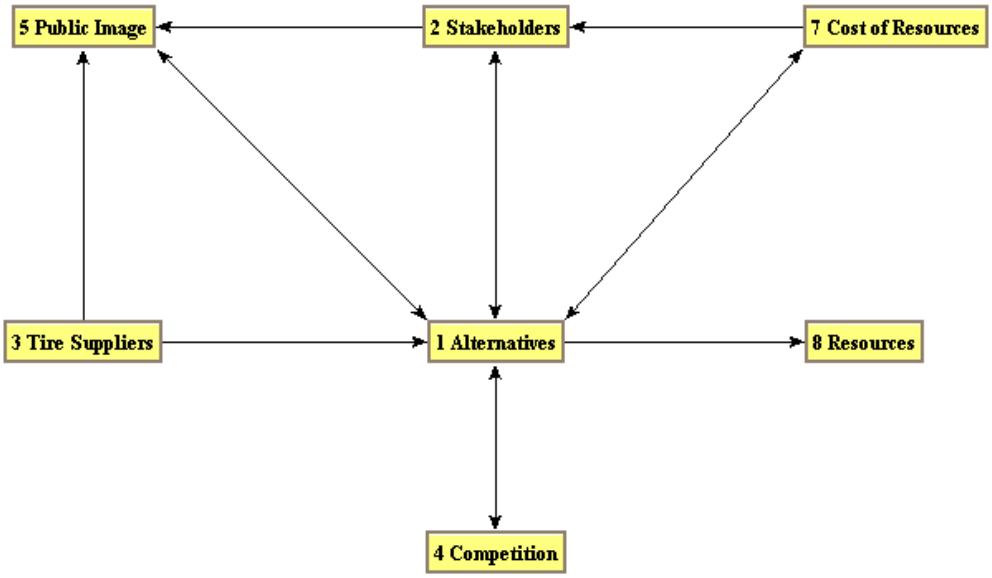

Figure 5.1 : Macro View of Economic Costs Network

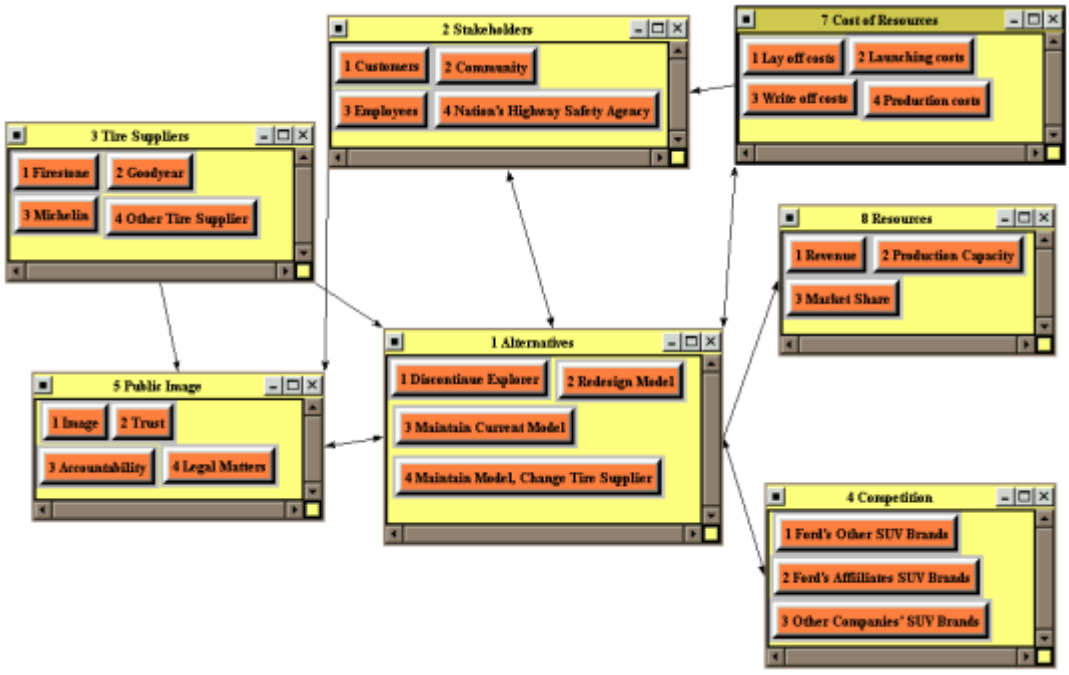

Figure 5.2 : Micro View of Economic Costs Network

The 'stakeholders' cluster refers to the people or group of people who could potentially be affected economically, based on different decision alternatives taken by Ford Motor Company. This cluster also affects 'public image' cluster, more specifically, 'legal matters'. The decision made by the company may encourage the customers to affect the economic

costs by increasing the number of lawsuits file against the company.

The ‘tire suppliers’ cluster refers to tire companies that may suffer economic costs based on the decision alternatives taken by Ford. This cluster will also affect the ‘public image’ cluster; more specifically, the legal matters. Again, the decision taken by Ford Company could affect the relationship between Firestone and Ford, increasing the economic costs caused by potential lawsuits filed by Firestone against the company.

The cluster ‘ cost of resources’ refers to the economic costs involved in any potential decision. The rationale used in this cluster is that the decision of laying-off will have a negative economic impact for the company.

The cluster ‘resources’ refers to the economic cost of making a decision, and basically its impact in the cluster’s components such as Revenues, Market Share and Production Capacity. For example, if the company decided to discontinue the Ford Explorer production there will be economic cost such as a decrease in Market Share and Revenues of the company.

The cluster ‘ public image’ also is affected by the alternatives. This cluster refers to the economic cost that could impact the company such as higher legal matters costs caused, for example, by the decision of maintaining the production of the Explorer Model without any change of tire suppliers.

The cluster ‘competition’ refers to the economic cost of making a decision related to the competition. For example, if the company decided to discontinue the production of the Ford Explorer model, other brands of Ford Company would also be affected by the decision since the customers will perceive the Ford SUV’s not as safe as they expected and this could cause additional economic costs.

The table below shows the result from the Economic Costs network.

Graphic	Alternatives	Priority	Ranking

1	0.1	4	Discontinue Explorer
2	0.3	1	Redesign Model
3	0.3	2	Maintain Current Model
4	0.1	3	Maintain Model, Change Tire Supplier

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Table 5.1 : Final Result in Economic Costs Network

5.2. Political Costs Clusters, Links and Judgments

The following table illustrates the clusters in this network and their respective elements:

Cluster	Elements
Alternative Sites	▪ I
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- Maintain the product configuration of Explorer Model.

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Stakeholders	Customers, Community, Employees and NHSA.
Tires Suppliers	Firestone, Goodyear, Michelin and Other tire suppliers.
Public Image	Image, Trust, Accountability and Legal matters.
Cost of Resources	Layoff Costs, Launching Costs, Writeoff Costs and Production Costs.

The inner and outer dependencies of clusters in the Political Costs model are shown in Figure 5.3 and Figure 5.4**.**

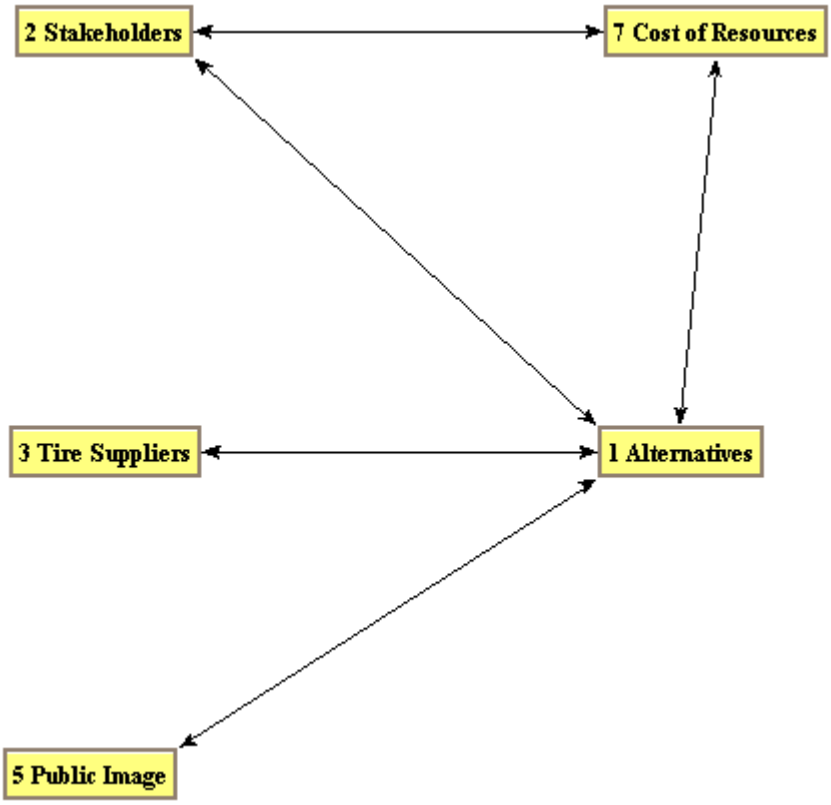

Figure 5.3 : Macro View of Political Costs Network

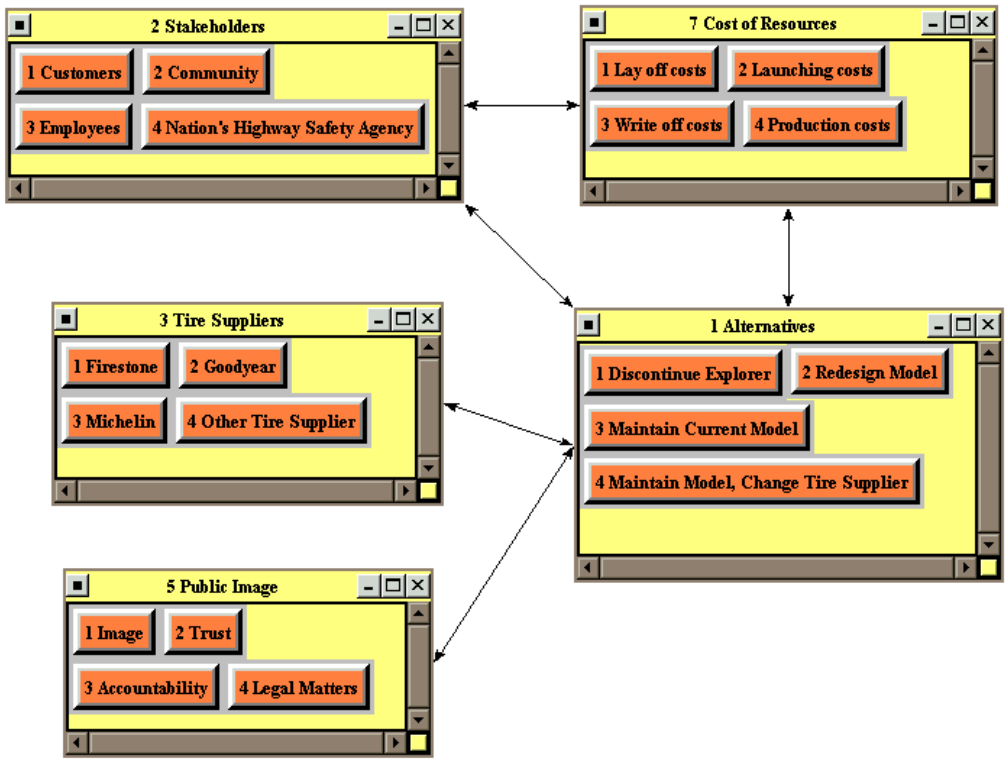

Figure 5.4 : Micro View of Political Costs Network

The 'stakeholders' cluster, refers to the people or group of people who will be negatively affected by decisions of Ford and that will be defined as political costs. For example, if the company decided to discontinue the model, then there will be additional political costs due to layoffs.

The 'public image' cluster will also be affected by the decision made by Ford. The Legal Matters would be the most important political cost incurred by the company.

The 'tire suppliers' cluster refers to the suppliers that could increase the political costs of the company by some of the decision the company could take. For example, if the company decided to change the tire suppliers, they may incur in new political costs with the company Firestone.

Finally, the cluster 'Cost of resources' refers to the political costs that the company would incur by taking any of the decisions. For example, if the company decided to discontinued the model, then they will probably incur in political costs based on the decision of laying-off some of the employees from the Ford Explorer production line.

The following table summarizes the results from the Political Costs network.

Graphic	Alternatives	Priority	Ranking
	1 Discontinue Explorer	0.0807	3
	2 Redesign Model	0.0000	4
	3 Maintain Current Model	0.1031	2
	4 Maintain Model, Change Tire Supplier	0.8161	1

Table 5.2 : Final Result in Political Costs Network

5.3. <u>Social Costs Clusters, Links and Judgments</u>

The following table illustrates the clusters in this network and their respective elements:

Clusters	**Elements**
Alternative Sites	

Stakeholders	Customers, Community, Employees and NHSA.
Public Image	Image, Trust, Accountability and Legal matters.
Brand Image	Quality, Safety, Prestige, Service.

The inner and outer dependencies of clusters in the economic risks model are shown in Figure 5.5 and Figure 5.6**.**

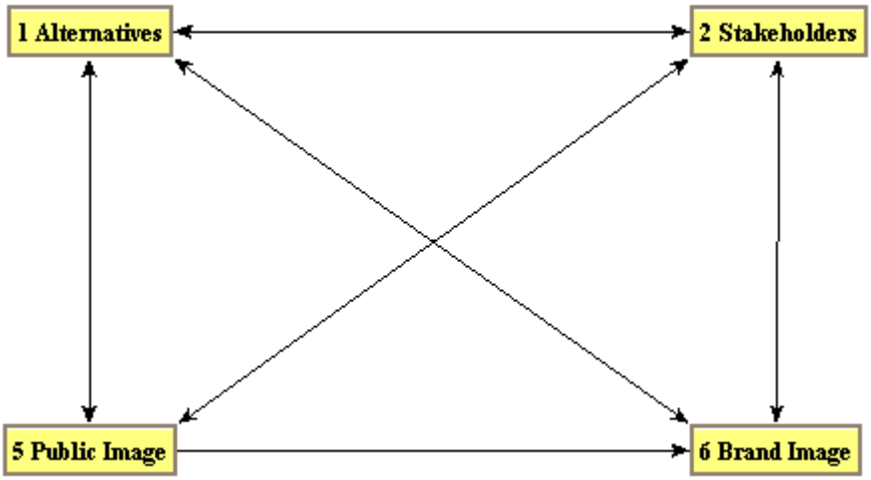

Figure 5.5 : Macro View of Social Costs Network

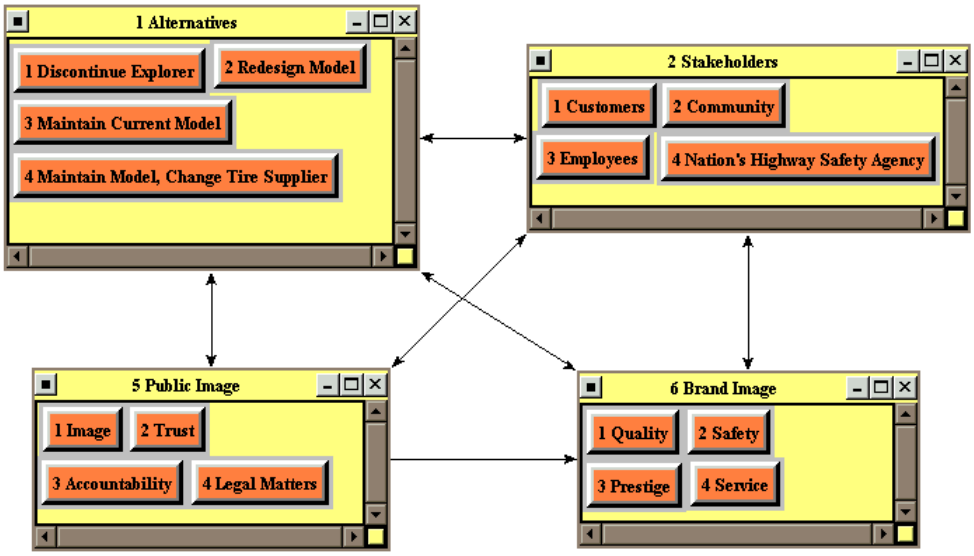

Figure 5.6 : Micro View of Social Costs Network

The 'stakeholders' cluster, refers to the people or group of people who will incur social costs, based on different decision alternatives taken by Ford Motor Company. There is a link between this cluster and 'public image' cluster. This means that, for example, if Ford maintain the Ford Explore model, then the customers will probably have a social cost, which will affect the Image and Trust on the vehicles from Ford Company. The same thing will happen between Stakeholders and some components of the 'brand image' cluster.

The next cluster that is affected is the 'public image' cluster. A bad image of the company as a consequence of a decision could

cause social costs for the company in terms of Image and Trust.

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[redacted]x plo rer	4 Maintain Model, Change Tire Supplier	0.2322	0.4300	2

Again, as we previously explained for the case of stakeholders, this cluster is also linked (and it will affect) to brand image and stakeholders.

The last cluster that is impacted is the 'brand image' itself. This requires no further explanation, as the alternative decisions taken will clearly have the power to change how stakeholders perceive the brand's image, with a probable negative impact that we refer to as a social cost for the company.

The following table summarizes the results from the Social Costs network.

Graphic	Alternatives	Priority	Ideal	Ranking

Table 5.3 : Final Result in Social Costs Network

5.3. Synthesis of Judgments in the Cost Model

The combined results from Economic Cost, Political Cost and Social Cost networks can be seen in the following table :

Alternative	Economic Costs Priority	Political Costs Priority	Social Risks Priority	Overall Priority	Overall Ranking

1. Discontinue Explorer	0.1397	0.0807	0.0521	0.4549	1
2. Maintain Model, Change Tire Supplier	0.1717	0.8161	0.2322	0.2438	2
3. Maintain Current Model	0.3233	0.1031	0.1759	0.1902	3
4. Redesign Model	0.3653	0.0000	0.5398	0.1111	4

This result indicates that from the Costs Model point of view, the alternative decision of discontinuing Explorer gives the highest cost for Ford Company, and the Redesign alternative will have the smallest impact on the company's costs.

6. RISKS MODEL

Unlike the Benefits and Costs models, Risks model is slightly different. Risks model contains indefinite interactions and results. In the case of Ford-Firestone we are discussing in this paper, risks are defined as the negative uncertainties in the decisions taken by Ford Motor Company regarding the Ford Explorer/Firestone matters.
We can classify risks into two categories, economic and social.

Economic risks refer to financial risks that may incur as a result of the decisions taken by Ford Motor Company. For example, if the decision is to discontinue Explorer, there is a risk that Ford will jeopardize their relationship with Firestone which may impact their relation in other Ford's brands. Social risks describe other than financial risks that may incur as a result of the decision taken by Ford. For example, if the decision is to maintain the current Explorer model, there is a risk that the number of accidents happens to customers who drive this car will increase.

6.1. Economic Risks Clusters, Links and Judgments

The following table illustrates the clusters in this network and their respective elements:

Clusters	**Elements**
Alternative Sites	▪ I ▪ F

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Tires Suppliers	Firestone, Goodyear, Michelin and Other tire suppliers.
Competition	▪ Ford's other SUV brands ▪ Ford affiliates' SUV brands ▪ Other companies' SUV brands
Public Image	Image, Trust, Accountability and Legal matters.
Cost of Resources	Lay off costs, Launching costs, Write off costs, and Production costs
Resources	Revenue, Production Capacity and Market Share.

The inner and outer dependencies of clusters in the economic risks model are shown in Figure 6.1 and Figure 6.2**.**

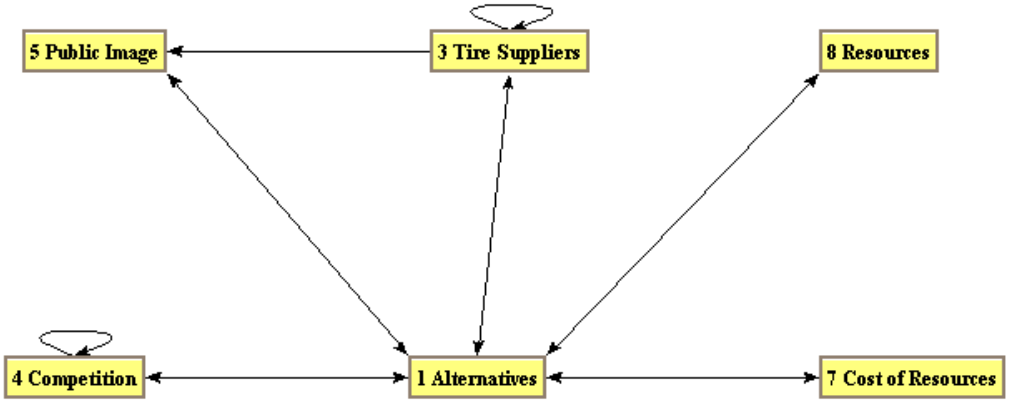

Figure 6-1 : Macro View of Economic Risks Network

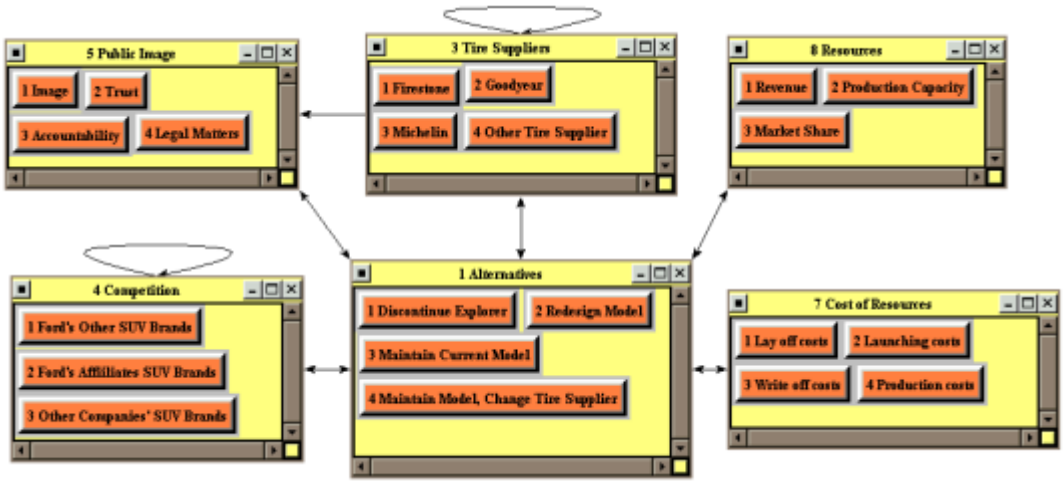

Figure 6-2 : Micro View of Economic Risks Network

The 'tire suppliers' cluster refers to tire companies that may have economic risks based on the decision alternatives taken by Ford. This cluster will also affect the 'public image' cluster; more specifically, the legal matters. There is also an inter-dependent among the nodes in the 'tire suppliers' cluster. This is because what one tire supplier does may impact how the other tire suppliers react.

The 'competition' cluster has no link with any other clusters except the 'alternatives' cluster. It is clear that the decision taken by Ford Motor Company regarding the Explorer will impact how the competition will behave. However, there is inter-dependent among the nodes in the 'competition' clusters. Similar to tire supplier, what one competitor does may impact how the other competitors react.

The last two clusters that are impacted are the 'resources' and the 'cost of resources'. These two clusters refer to internal resources, both financial and non-financial resources. It is typical that the internal resources of a company will have economic risks due to a decision taken by the top management of the company. For example, there will be an economic risk towards the revenue and lay off costs due to the decision taken.

The following table summarizes the results from the Social Benefits network.

Graphic	Alternatives	Priority	Ranking

	1 Discontinue Explorer	0.1983	4
	2 Redesign Model	0.3548	1
	3 Maintain Current Model	0.1991	3
	4 Maintain Model, Change Tire Supplier	0.2477	2

Table 6.1 : Final Result in Economic Risks Network

6.2. Social Risks Clusters, Links and Judgments

The following table illustrates the clusters in this network and their respective elements:

Clusters	Elements
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Explore Model.

- Maintain the Product Portfolio Explore Model.

el, but to change the interest supplier.

Stakeholders	Customers, Community, Employees and NHSA.
Public Image	Image, Trust, Accountability and Legal matters.
Brand Image	Quality, Safety, Prestige, and Service

The inner and outer dependencies of clusters in the Social Benefits model are shown in Figure 6.3 and Figure 6.4**.**

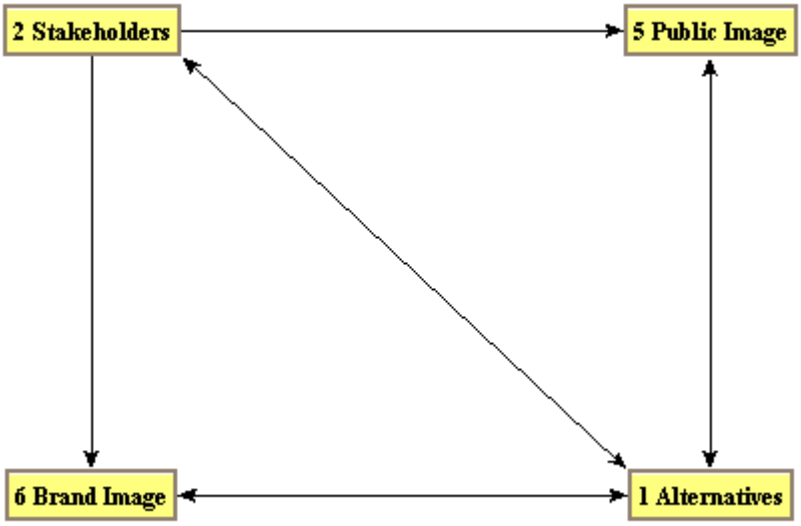

Figure 6-3 : Macro View of Social Risks Network

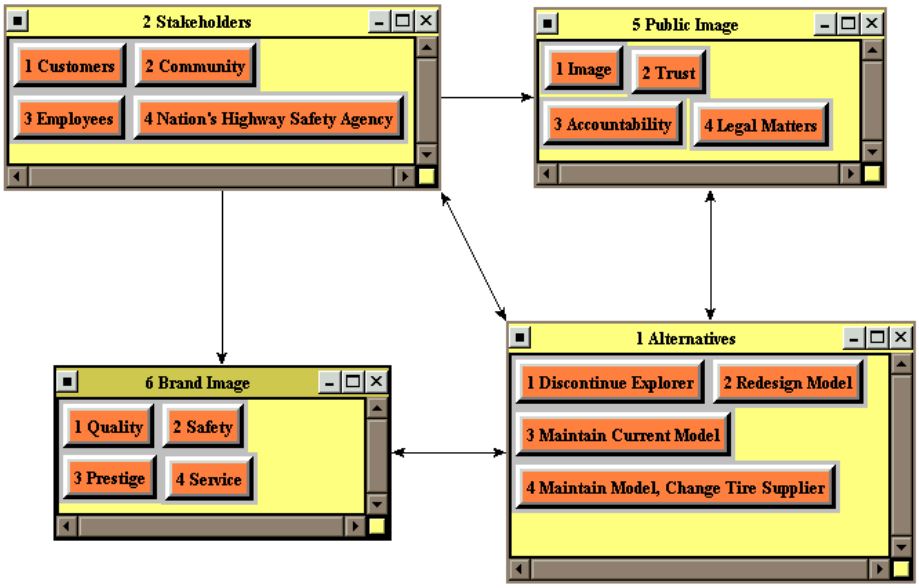

Figure 6-4 : Micro View of Social Risks Network

The 'stakeholders' cluster refers to the people or group of people, who could have social risks, based on different decision alternatives taken by Ford Motor Company. This cluster practically affects other clusters in this network, including the 'public image' and 'brand image' clusters. In this network, customers and community have higher impact on the network than the other two stakeholders.

The stakeholders can imply social risks on ‘public image’ cluster that will affect how they see the company’s public image in terms of trust and image.

The stakeholders also affect the ‘brand image’ cluster similarly to the ‘public image’ cluster. In this network, safety and prestige are considered to be more significant that the other two brand image.

As you can see, the ‘stakeholders’ cluster plays a very important role in this network. This is primarily due to the fact that this cluster is the one that will have the highest social risks related to the decisions taken by Ford.

The following table summarizes the results from the Social Risks network.

Graphics	Alternatives	Priority	Ranking
	1 Discontinue Explorer	0.1025	3
	2 Redesign Model	0.6015	1
	3 Maintain Current Model	0.0532	4
	4 Maintain Model, Change	0.2428	2

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Table 6.2 : Final Result in Social Benefits Network

6.3. Synthesis of Judgments in the Risks Model

Both networks in the benefit have independent results that will then feed the higher-level network (the overall benefit network).

The combined results from Economic Risks and Social Risks networks can be seen in the following table :

Alternative	Economic Risks Priority	Social Risks Priority	Overall Priority	Overall Ranking
5.	0.1	0.0	0.4	1
991532850				
6.	0.1	0.1	0.2	2
983025875				
7.	0.2	0.2	0.1	3
477428496				

8. 0.3 0.6 0.0 4
   548015780

Table 6.3 : Synthesize Judgments in the Risks Model

Before we begin to analyze this model, remember that Risks Model is an inverse model. It means that the first rank result will have higher risk, and the last rank result will have less risk.

The result from the table indicates that from Risks Model point of view, the alternative decision of maintaining current model gives the highest risks, both from economic and social standpoints.

This final result is mostly driven by the economic risks, which has the 'lowest' priority of 0.0532, in contrast with the economic risks of 0.1991.

The least risky alternative will be to redesign the model, with overall priority of 0.0780. In this alternative, the driven force is the social risks which contribution is 0.6015 in contrast to the economic risks of 0.3548. It means that for this alternative, the social risks have almost twice the influence than the economic risks.

Another observation is that the overall priority for the first rank alternative, i.e. to maintain current model, has significant difference than the last rank alternative. As seen from the table, the overall priority for alternative 'maintain current model' has 0.4850 priority while the last rank alternative, i.e. 'redesign model', has 0.0780 priority. The difference shows just how less risky the 'redesign model' alternative compare to the 'maintain current model'.

7. SENSITIVITY ANALYSIS

In order to determine when different alternatives become preferable, we did a sensitivity analysis by varying different weights and ratings in the model.

We started the analysis by increasing (and decreasing) the weight of the Benefits.
When we increased the weight of the Benefits, the rating of the alternatives are as follow : discontinue Explorer, maintain model & change the tire supplier, redesign model, and maintain current model.
When we increased the weight of the Benefits, the rating of the alternatives are as follow : redesign model (0.43), maintain model & change tire supplier (0.22), maintain current model (0.19), and discontinue Explorer (0.16).

We found an interesting observation when we decreased the weight of the benefits until it is close to zero. When we do this,

the rating of the alternatives are as follow : maintain current model and maintain current model & change tire supplier have exactly the same priority (0.21).
It means that for the two alternatives above, the costs and risks may offset and resulted in the same rating.

Next, we did the sensitivity analysis for the cost variable. The results we got by increasing the weight of the costs are as follows: redesign model, maintain current model, maintain model & change tire supplier, and discontinue the Explorer model production.

This means that if the company perceives the cost as the most important criteria to make the decision, they will decide to redesign the model. From the result, we conclude that this alternative seems to be the best choice from costs standpoint.

On the other hand, if we decrease the weight of cost, the result will be to discontinue, redesign model, maintain model & change tire supplier, maintain current model. This means that the risk criteria seems to be more important than the benefits, which leads to the decision of discontinuing the production of the Ford Explorer model.

The last criterion we analyzed was the risk. The results we got when we increased the risk weight are as follows: redesign model, maintain model & change tire supplier, discontinue, maintain current model. The conclusion supports our initial thoughts that maintaining the current model (without change the tire supplier) is the riskiest decision for the company to make.

Finally, we decreased the weight of the risk, and got the following results: discontinue, redesign model, maintain model & change tire supplier, maintain current model.

8. CONCLUSION

The model was designed to find the optimal decision for Ford Motor Company regarding the Explorer/Firestone conflict. The criteria we utilized to determine the optimal decisions are Benefits, Costs, and Risks. Each of the criteria above is broken down further into control criteria and detail networks.

Table 8.1 below gives the overall results.

Alternative	Benefits Priority	Costs Priority	Risks Priority	Overall Priority	Overall Ranking

Redesign Model	0.271	0.111	0.780	0.335	1
Discontinue Explorer	0.939	0.549	0.875	0.016	2
Maintain Model, Change Tire Supplier	0.491	0.438	0.496	0.324	3
Maintain Current Model	0.498	0.902	0.850	0.325	4

Table 8.1 : Complete Model Synthesize Judgments

We found the second alternative, i.e. ‘Redesign Model’ as the highest ranking with overall priority of 0.3335.
The benefit for this alternative is not very attractive. In fact, the benefit is the second lowest among the other alternatives. However, both the costs and risks for this alternative are extremely low. These offset the low benefit and contribute to the end result, which drive this alternative to the first or best option for Ford Motor Company to take.

We also analyzed the result for the second best alternative.
Alternative 1, i.e. ‘Discontinue Explorer’ got the second highest priority. The priority of 0.3016 is very close to the highest ranking result.

As you can see from the table, this alternative has the highest benefit. The benefit is so high, that it is almost twice as high as the next alternative (maintain model, change tire supplier). Regardless, this result is offset by the fact that it has the highest costs and the second highest risks.

The last alternative, i.e. maintain current model, change tire supplier, has a surprising result. This alternative has the second highest benefit (0.2491), the second highest costs (0.2438), and the second lowest risk (0.1496). If you only look at each network independently, these are very good results. Nevertheless, when you combine the results and look at the overall picture, it does not provide you with a high number. The costs model plays a significant role in determining the end result for this alternative.

As concurred by the result of this model, alternative 3 (maintain current model), received the lowest ranking. This is primarily driven by the risks and benefit. This alternative has the highest risk result (0.4850), and the lowest benefit result (0.0498). This should be the last alternative decision that Ford should take in the case "Ford Explorer"[4].

[4] Our results are emphasized by the decision taken by Ford of redesigning the Explorer model in the Explorer/Firestone case, which was made in March 2001.

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