

**Optimizing the Benefits of
Health and Safety Training for the
Kensington Company**

By

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TABLE OF CONTENTS

Chapter

1	Abstract	1
2	Introduction.....	2
2.1	Training Projects	2
2.1.1	Child Care CPR.....	4
2.1.2	Child Care First Aid.....	4
2.1.3	Adult/Infant/Child CPR.....	4
2.1.4	Adult CPR/AED (Automated External Defibrillator).....	4
2.1.5	Standard First Aid/AED.....	5
2.1.6	First Aid.....	5
2.1.7	Infant/Child CPR.....	5
2.1.8	CPR/AED for Professional Rescuer.....	5
2.1.9	First Aid-Responding to Emergencies	5
2.1.10	Baby Sitting's Training	6
2.2	Project Goal.....	6
2.3	Objectives.....	6
3	Model Implementation	8
3.1	Overview	8
3.2	Model Structure.....	8
3.2.1	Goal	8
3.2.2	Objectives.....	8
3.2.3	Alternatives	9
3.2.4	Participants	10
3.3	Prioritization.....	11
3.3.1	Rating Intensities.....	11
3.3.2	Objectives Prioritization.....	12
3.3.3	Prioritization of Objectives and Sub-objectives.....	13
3.4	Contributions Measured	14
3.4.1	Maximum Benefits Constrained by Costs.....	15

3.4.2	Benefits Optimized.....	15
4	Summary	Error! Bookmark not defined.

Tables

1	Project Coast.....	3
2	Combines Rating Intensities.....	11

Figures

1	Treeview of the Goals, Objectives, and Sub-Objectives.....	9
2	Training Projects as Alternatives.....	10
3	Team Participants.....	11
4	Pairwise Graphical Comparison by Tom.....	12
5	Pairwise Graphical Comparison by Daniel.....	12
6	Pairwise Graphical Comparison by Michelle.....	13
7	Pairwise Graphical Comparison by Pat.....	13
8	Prioritization of Objectives and Sub-Objectives.....	14
9	Measures of Contribution Prior to Normalization.....	14
10	Increasing Budget (Efficient Frontier).....	15
11	Optimized Allocation of Resources.....	16

1 ABSTRACT

The Kensington Company is a non-profit organization led by volunteers. The company has five departments: Emergency Services, Health and Safety Services, Human and Volunteer Resources, Accounting, and Fund Raising. The role of the Health and Safety Services department is to teach life-saving skills to the local community by executing a series of training projects. Kensington has delivered health and safety training for five years. In the past, the Kensington Company selected its training projects based on budget and decisions made among staff using BOGSAT (a Bunch of Old Guys/Gals Sitting Around Talking). For Calendar Year (CY) 2005, the Health and Safety Services department has 10 projects for the new CY2005 training year that they are considering for implementation. The maximum cost of all ten projects is \$1,013,460. However, the availability of funding to support these projects is \$900,000. This paper discusses the decision-making process and model used to determine which projects are funded and to what level.

2 INTRODUCTION

The Kensington Company is a non-profit organization that provides relief to victims of disasters and help people prevent, prepare for, and respond to emergencies. The company's region of service consists of nine counties in New York, with a total population of approximately 8 million. The mission of the Health and Safety Services department is to help people prevent, prepare for, and respond to emergencies and the major role of this department is to provide life-saving skill training to the general population, as well as to professional rescuers.

Each fall, the company CEO announces the coming CY's budget for each department. The CY2005 budget for the Health and Safety Services department is \$900,000. The department is considering implementing 10 projects for CY05. Each project teaches one type of course (e.g. Infant/Child CPR), consisting of a defined number of classes. The Kensington Company's top management directed the Health & Safety Services Department chief to establish a team to derive a budget that promotes achievement of the company's objectives. The team consisted of Daniel, Michelle, Pat, and Tom, four managers experienced in the delivery of training.

The project team adopted the Analytic Hierarchy Process (AHP) to structure their decision-making, modeled through the decision support software, Expert Choice. To optimize benefits constrained by costs and budget, the team structured their model as an Activity Level Resource Allocation (ALRA) decision. That is, the team established several levels of funding for the three highest cost projects (Child Care CPR, Child Care First Aid, and Adult/Infant/Child CPR). Moreover, the team set constraints to limit the resource allocation to one level only in each of these projects (See Table 1 for details).

During the decision-making process, the team established goal and objectives. Using five levels of intensities (i.e. extreme, significant, moderate, some, and tad) the team made paired comparisons individually about the importance of objectives with respect to the goal. With these judgments combined and synthesized, the team used the Resource Aligner function within Expert Choice to maximize the benefit of selected alternatives, resulting in a rational allocation of resources.

2.1 Training Projects

During the first meetings, the team was educated on the process of the decision-making. Collectively, the team decided to use the top-down approach for the process where they will determine weight of the goal and objectives first. Then they derived the weights of the alternative projects with respect to each objective or sub-objective.

After the team created the goal and objectives during the second meeting, they established five levels of intensity (extreme, significant, moderate, some, and tad). Using pairwise

comparison in Expert Choice, they compared the intensities against each other and against each objective that established a combined rating for each project (called alternative in Expert Choice) against each objective. Then, using the solver, the Expert Choice model optimized the benefit of health and Safety training model. As a result, the model allocated Level 4 funding to the Child Care CPR project (instead of the highest level, Level 6) and maximum funding to the remaining nine projects. Subsequently, the result of the decision was forwarded to the department chief and the company CEO for their final decision.

The cost of each project is determined by the cost of each student multiplied by six (six is the average number of students per class). Then, the result is multiplied by the number of classes could be offered for that particular course in CY2005 (Cost of each project = number of class for a particular course X cost of each student X six). Table 1 is the breakdown of the cost for each project and levels.

Table 1-Project Costs

Note:

Due to the high cost of the following projects, groups and levels (within each group) were established to enhance the optimization process. To avoid improper allocation of funding, a constraint was created limiting the resource allocation to only one level in each of these projects.

1. Child Care CPR Group has six levels (Level 1 through level 6).
2. Child Care First Aid Group has four levels (Level 1 through 4).
3. Adult/Infant/Child CPR Group has two levels (Level 1 through 2).

Project	Cost Per/Student	Class Size	No. of Classes	Total Project Costs
Child Care CPR Level 1	\$61	6	158	\$57,828
Child Care CPR Level 2	\$61	6	316	\$115,656
Child Care CPR Level 3	\$61	6	474	\$173,484
Child Care CPR Level 4	\$61	6	632	\$231,312
Child Care CPR Level 5	\$61	6	790	\$289,140
Child Care CPR Level 6	\$61	6	950	\$347,700
Child Care First Aid Level 1	\$62	6	200	\$74,400
Child Care First Aid Level 2	\$62	6	400	\$148,800
Child Care First Aid Level 3	\$62	6	600	\$223,200
Child Care First Aid Level 4	\$62	6	800	\$297,600
Adult/Infant/Child CPR Level 1	\$70	6	120	\$50,400
Adult/Infant/Child CPR Level 2	\$70	6	240	\$100,800
Adult CPR/AED	\$43	6	220	\$56,760
Standard First Aid/AED	\$52	6	150	\$46,800

Table 1-Project Costs (Continue)

Project	Cost Per/Student	Class Size	No. of Classes	Total Project Costs
First Aid	\$62	6	120	\$44,640
Infant/Child CPR	\$61	6	120	\$43,920
CPR/AED for Professional Rescuer	\$63	6	85	\$32,130
First Aid-Responding to Emergencies	\$108	6	45	\$29,160
Baby Sitting Training	\$75	6	15	\$6,750

2.1.1 Child Care CPR

This seven-hour course is offered only to child care providers and focuses on the special application of cardiac and breathing emergency skills to infants and children through the age of eight. Child care providers will learn how to reduce the risk of injury or death by properly identifying breathing and cardiac emergencies and administering the appropriate CPR measures.

2.1.2 Child Care First Aid

This four-hour course is offered only to child care providers and it provides first aid and safety skills, equipping child care providers the skill to recognize and provide basic first aid care for injuries and sudden illnesses. Students will learn how to identify and care for a variety of medical emergencies, including severe bleeding, shock, muscular and skeletal injuries, child safety, other sudden illnesses, and how to reduce the risk of disease transmission while providing care.

2.1.3 Adult/Infant/Child CPR

This comprehensive eight-hour CPR course provides certified training for use with adult, infant, and child victims in a variety of emergency situations. Students will learn how to reduce the risk of injury or death by properly identifying breathing and cardiac emergencies and administering appropriate CPR procedures. Students will also learn when and how to use the emergency medical service (EMS) and how to reduce the risk of cardiovascular disease. This course is indispensable for all adults and teenagers who may be called upon to assist others in an emergency.

2.1.4 Adult CPR/AED (Automated External Defibrillator)

This four and a half hour course provides individuals with certified training for use with adult in a variety of emergency situations. Students will learn how to reduce the risk of injury or death by properly identifying breathing and cardiac emergencies and administering the appropriate CPR procedures. Students will also learn when and how to use the EMS and how to reduce the risk of cardiovascular disease. It also teaches the use of an AED (Automated External Defibrillator) for victims of sudden cardiac arrest. This

course is indispensable for all adults and teenagers who may be called upon to assist others in an emergency.

2.1.5 Standard First Aid/AED

This eight-hour course teaches the latest in emergency cardiac care to an adult, such as how to use an AED for victims of sudden cardiac arrest. It also covers handling emergencies, CPR for adults, first aid for injuries, and sudden illnesses. This course is ideal for anyone whose workplace or home has or is soon likely to have an AED, as well as individuals who would like to include AED skills as part of their training in assisting an emergency.

2.1.6 First Aid

This four-hour course provides complete first aid and safety skills, equipping individuals to recognize and provide basic first aid care for injuries and sudden illnesses. Students will learn how to identify and care for a variety of medical emergencies, including severe bleeding, shock, muscular and skeletal injuries, other sudden illnesses, and how to reduce the risk of disease transmission while providing care.

2.1.7 Infant/Child CPR

This seven-hour course focuses on the special application of cardiac and breathing emergency skills to infants and children through the age of eight. Students will learn how to reduce the risk of injury or death by properly identifying breathing and cardiac emergencies and administering the appropriate CPR measures. Infant/Child CPR is indispensable for parents, day care providers, babysitters, nannies, grade school teachers and staff, and anyone else who is in frequent contact with infants and small children.

2.1.8 CPR/AED for Professional Rescuer

This nine-hour course is an advanced level course for individuals who have a job-related "duty to act" to emergencies which includes an overview of body systems and medical and legal issues. Students learn how to recognize and provide care in respiratory and cardiac emergencies for adults, children, and infants with special emphasis on two-rescuer CPR use of the resuscitation mask, bag-valve mask, and AED. This course also includes techniques for minimizing the risk of disease transmission and for special resuscitation situations. This course is especially recommended for medical professionals, lifeguards, aerobics/fitness/sports instructors, and public and private safety/security employees.

2.1.9 First Aid-Responding to Emergencies

This 16-hour course is designed to provide individuals with in-depth first aid skills to care for those with life-threatening emergencies. Students will learn how to identify and care for a variety of medical emergencies including severe bleeding, shock, muscular and

skeletal injuries, emergency childbirth, and moving victims. The course also provides special information on what to do when advanced medical help is not available and is designed for individuals (including professional rescuers) who desire to learn additional working knowledge of first aid procedures.

2.1.10 Baby Sitting's Training

This eight-hour course provides adolescents (11-15 years old) the information and skills necessary to provide safe and responsible care for children in the absence of parents or guardians. Students will learn the responsibilities of a babysitter and develop important skills, including home safety, safe play, basic child care, first aid, and leadership. Lessons in this course include how to handle an emergency, prevent accidents, play with children of different ages, diapering and dressing infants, and food and kitchen safety. This course is ideal for new and experienced babysitters who are seeking to improve their ability to care for young children.

2.2 Project Goal

The goal of the decision-making process is to “**optimizing the allocation of funding for the delivery of health and safety courses**” to local community. The total available funding for CY05 training projects is \$900,000.

2.3 Objectives

During the second meeting, the team developed a set of prioritized objectives that match the department's mission and role. Then each objective was defined to ensure it serves the purpose of the decision-making process.

1. Objective 1 - Educating the Population in Life-Saving Skills

The major objective of these projects is to educate the public, as well as professional rescuers, in life saving skills.

a. Objective 1, Sub-Objective 1 - Improve Public Safety

By educating the public and professional rescuers in life-saving skills, it increases the number of people who can perform life-saving tasks thus improves the public safety.

b. Objective 1, Sub-Objective 2 - Improve Quality of Life of the Public

When the public feels safer, it improves their quality of life.

c. Objective 1, Sub-Objective 3 - Maintain Instructor Skill Sets

Each course is required to be taught by a qualified instructor, and the qualification for teaching each course is considered as a skill set. In order to maintain the

instructor's skill sets, they are required to teach each type of courses they are qualified (skill set) at least twice a year.

2. Objective 2 - Improve Quality of Life of Instructors

As number of teaching hours increases, it will increase the instructor's income earning accordingly. Increase in income earning will improving their quality of life.

3. Objective 3 – Profitability

Although making profit is not the primary objective of the organization, maximizing profits and minimizing losses from delivery of classes can help offset the overall expenses of the company.

4. Objective 4 - Keep the Cost to Students to a Minimum

One of the major factors of increasing the number of enrollment is to keep the cost to students to a minimum.

5. Objective 5 - Maintain and Improve the Company's Reputation

In general, the life-saving skill method of this company is the preferred method within the population. By continuing to offer life-saving courses, it maintains and improves the company's reputation.

3 MODEL IMPLEMENTATION

3.1 Overview

Historically, the Health and Safety Services department has been under funded. As a result, the process of determining the distribution of funds has created great tension among employees within the Health and Safety Services department. They often sit around using BOGSAT method for 6 to 10 hours at a time to decide which projects to be funded. To help reduce tension, the company CEO has agreed to allow the department to use Expert Choice to create a model based on the AHP for the decision-making. Expert Choice was chosen to model this decision-making process, because Expert Choice is capable of comparing multiple objectives, multiple projects, and judgment of the managers and derive the results based on the prioritization of objectives.

This section describes the activities that find the best combination of alternatives that contribute to the overall objectives of the department through the implementation of an ALRA model using Expert Choice. The major modeling activities are:

- Structure the model;
- Prioritize intensity ratings, objectives, and sub-objectives;
- Measure alternatives' contributions; and
- Find the best combination of alternatives.

3.2 Model Structure

3.2.1 Goal

The first step in structuring the decision problem is to define the goal unambiguously. The project team identified the overall goal as the desire to optimize the allocation of funding for the delivery of health and safety courses to the local community, constrained by the Kensington Company's annual budget. The team began structuring the decision model by acknowledging that attaining the project goal required the achievement of multiple objectives that best fulfill the company's purpose.¹ The team set about structuring the model to support the *rational* allocation of resources to optimize training delivery.

3.2.2 Objectives

The team worked assiduously in defining the projects' objectives by asking the question "*Why do we want to optimize the allocation of funding for the delivery of health and safety*

¹ Forman, Ernest H., and Mary Ann Selly. *Decision by Objectives, How to Convince Others That You Are Right*. River Edge, New Jersey: World Scientific Publishing Co. Pte. Ltd. 2002. Hereafter cited in text.

courses?" By focusing on objectives rather than the attributes or criteria of alternatives, the team avoided ambiguities that often arise when deriving preferences (Forman and Selly, 2002). Finally, the team further detailed the decision model by adding sub-objectives to the objective of educating the population in life-saving skills. Figure 1 shows the "treeview" or hierarchical arrangement of the goal, objectives, and sub-objectives that structure much of the decision model.

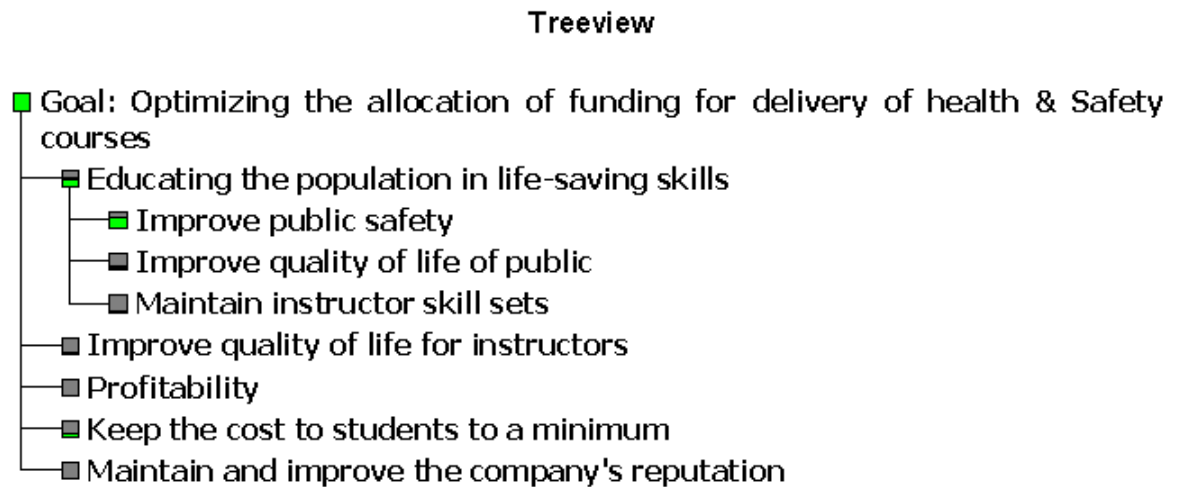


Figure 1. Treeview of the Goal, Objectives, and Sub-Objectives

3.2.3 Alternatives

After defining the objectives and sub-objectives, the team generated possible alternatives by asking the question "*What are all possible solutions of the problem?*" The emphasis was on soliciting from the team suggested solutions while keeping in mind the questions (Forman and Selly, 2002):

- "*What is the cause of the problem?*"
- "*What are possible solutions to the problem?*"
- "*What solutions do you (team participants) suggest?*"

The alternatives designed for achieving the objectives consist of training projects that require varying levels of allocation of Kensington Company resources. The challenge of the team was to apply their experiences in identifying and designing training projects that best achieve the company's goal and objectives. Figure 2 lists the training projects, each of which represents a discrete alternative.

Ideal mode	
AID	Alternative
A1	Child Care CPR Level 1
A11	Child Care CPR Level 2
A12	Child Care CPR Level 3
A13	Child Care CPR Level 4
A17	Child Care CPR Level 5
A18	Child Care CPR Level 6
A2	Child Care First Aid Level 1
A19	Child Care First Aid Level 2
A20	Child Care First Aid Level 3
A21	Child Care First Aid Level 4
A3	Adult/Infant/Child CPR Level 1
A22	Adult/Infant/Child CPR Level 2
A4	Adult CPR/AED
A5	Standard First Aid/AED
A6	First Aid
A7	Infant/Child CPR
A8	CPR for Professional Rescuer
A9	First Aid-RTE (Responding to
A10	Baby Sitting Training

Figure 2. Training Projects as Alternatives

3.2.4 Participants

Team members participated in structuring the decision model and contributed their points of view about the importance of objectives and the prospective contributions offered by alternatives. Expert Choice enhanced the quality of the team's decisions by assisting participants—through a facilitator—in the definition of a structured model, and the posting, combining, and assessment of their independent judgments. The facilitator lead participants in making paired comparisons with respect to the objectives and alternatives; and assisted the team when entering ratings into Expert Choice (Forman and Selly, 2002).

Beth Myerson, Vice President of Human Resources for Kensington Company, was the facilitator. Ms. Myerson did not make judgments about the decision model or make paired comparisons, which is appropriate for the role of facilitator. Figure 3 identifies the four team participants who made judgments about the various facets of the decision problem.

List of Participants

PID	PersonName	Combined	Email	Participating	Eval	Location	Weight	Keypad	Wave	Password
2	Tom	<input type="checkbox"/>		<input checked="" type="checkbox"/>				2	1	
3	Daniel	<input type="checkbox"/>		<input checked="" type="checkbox"/>				3	1	
4	Michelle	<input type="checkbox"/>		<input checked="" type="checkbox"/>				4	1	
5	Pat	<input type="checkbox"/>		<input checked="" type="checkbox"/>				5	1	

Figure 3. Team Participants

3.3 Prioritization

3.3.1 Rating Intensities

The project team adopted a ratings approach that consisted of defining "intensities" of importance with respect to each of the objectives. These intensities took the place of alternatives in the first stage of the evaluation (Forman and Selly, 2002). For example, instead of comparing the relative importance of two specific alternatives with respect to the objective IMPROVE PUBLIC SAFETY, the team compared the relative importance for a non-specific alternative that possesses EXTREME improvement of safety to some other alternative that offers SOME improvement. This resulted in measures of importance for the intensities (Forman and Selly, 2002). The team effectively derived ratio scale priorities about the importance of each objective, as well as ratio scale priorities for the intensities below each objective (Forman and Selly, 2002). The ratio scale priorities were then combined to give an overall ratio scale measure of the preference for the alternatives. Table 2 reports the combined rating intensities derived by team for each objective.

Table 2-Combined Rating Intensities

Rating	Objective: Education	Objective: Life	Objective: Profitability	Objective: Cost	Objective: Reputation
Extreme	1.00	1.00	1.00	1.00	1.00
Significant	.440	.465	.410	.633	.366
Moderate	.166	.181	.175	.209	.131
Some	.052	.140	.086	.076	.037
Tad	.020	.048	.039	.013	.014

3.3.2 Objectives Prioritization

The project team chose to enter their judgments during a group session using their individual keypads. Each participant used the graphical mode within Expert Choice to enter rating intensities and judgments about the importance of objectives with respect to attaining the goal. The graphical pairwise comparison scale expresses the relationship of two elements as the ratio of the lengths of two bars. Figure 4 through Figure 7 illustrate the graphical pairwise comparison scales made by each member of the team. The facilitator combined participants' judgments as a combined instance within Expert Choice.

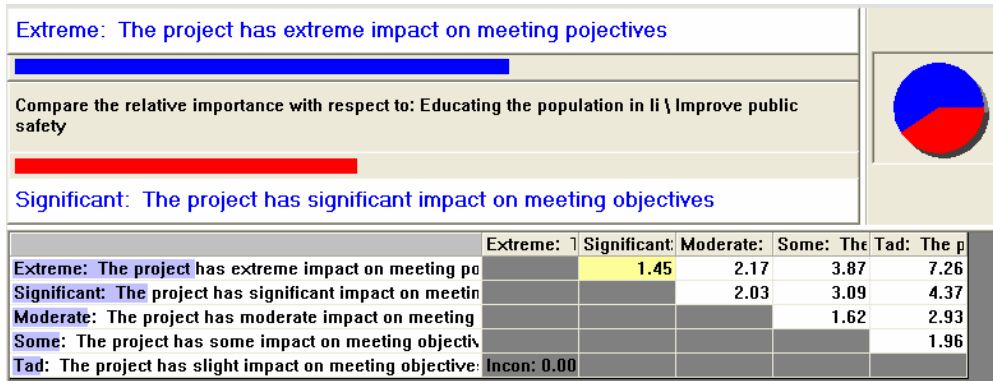


Figure 4. Pairwise Graphical Comparison by Tom

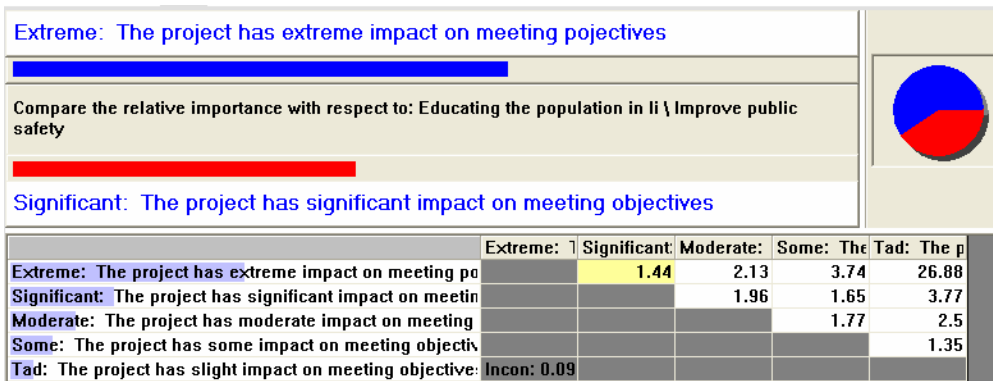


Figure 5. Pairwise Graphical Comparison by Daniel

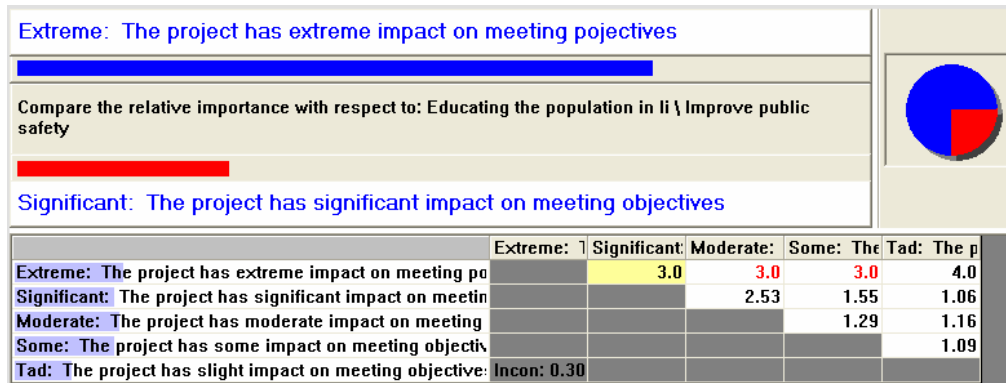


Figure 6. Pairwise Graphical Comparison by Michelle

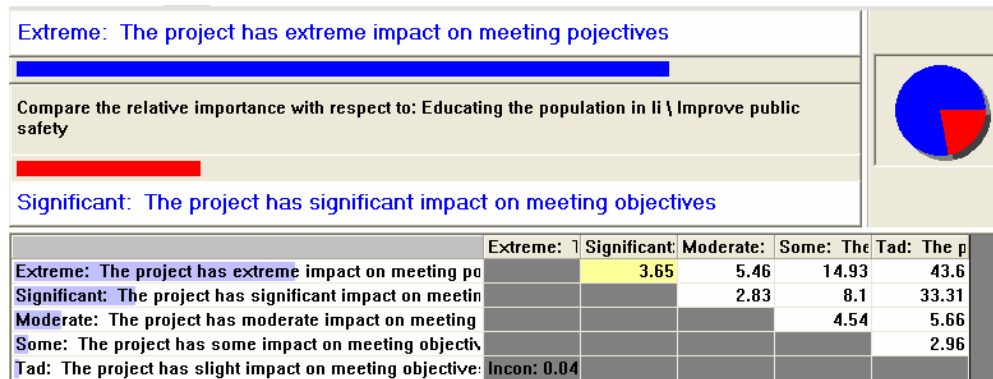


Figure 7. Pairwise Graphical Comparison by Pat

3.3.3 Prioritization of Objectives and Sub-objectives

Through combined rankings, educating the community in life-saving skills is judged to be the most important objective by the project team. This objective—and its sub-objectives—contribute most to the goal of serving the community, since life-saving skills translate directly into the protection of life. The objective rated to be least important, however, is maintaining the company's profitability. This ranking is consistent with Kensington Company's charter. Since it is a non-profit company, Kensington's net income redistributes to the community through the delivery of training projects. Figure 8 shows the priorities sorted by importance with respect to achieving the goal.

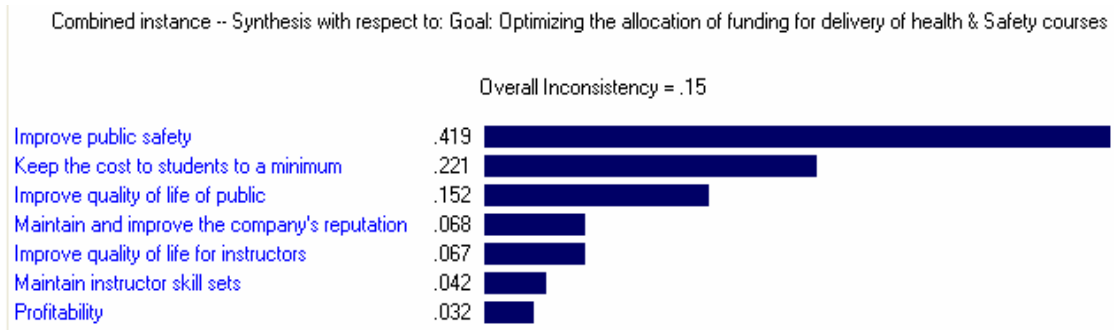


Figure 8. Prioritization of Objectives and Sub-Objectives

3.4 Contributions Measured

The members of the project team agreed to rank each alternative (training project) with respect to its importance to promoting objectives using Expert Choice. The rankings were then consolidated to form a combined ranking for each alternative under each objective. Figure 9 shows the measures of contribution prior to normalization for each alternative. The values in the Total column represent the weighted sum of the values (priorities) for the alternative across all the covering objectives. Project A10, "Baby Sitting Training" has a value of 0.783 and is projected to contribute the greatest benefit. When the Totals are normalized, such that an "ideal" alternative, one that rated best would have a value of 1.00 in the Total column. In this case, the value in the Total column with a value of 1.00 is Project A10, which reflects Project A10 is the ideal alternative.

AID	Ideal mode	Alternative	Total	Costs	RATINGS Educating the population in life safety(L: .683 G: .355)	RATINGS Educating the population in life quality of public(L: .247 G: .069)	RATINGS Educating the population in life Maintain instructor skill sets(L: .083 G: .083)	RATING Improve quality of life for instructors(L: .083 G: .039)	RATINGS Profitability(L: .039 G: .274)	RATING Keep the cost to students to a minimum(L: .274 G: .084)	RATINGS Maintain and improve the company's reputation(L: .084 G: .084)
A10		Baby Sitting Training	0.783	\$6,750	0.793	0.919	0.294	0.181	0.109	1	0.942
A22		Adult/Infant/Child CPR Level 2	0.568	\$108,000	0.653	0.838	0.466	0.509	0.308	0.392	0.589
A18		Child Care CPR Level 6	0.548	\$347,700	0.511	0.619	0.491	0.316	0.331	0.7	0.448
A21		Child Care First Aid Level 4	0.534	\$297,600	0.533	0.574	0.466	0.374	0.39	0.619	0.448
A13		Child Care CPR Level 4	0.510	\$231,312	0.511	0.619	0.416	0.245	0.269	0.619	0.392
A17		Child Care CPR Level 5	0.510	\$289,140	0.511	0.619	0.416	0.245	0.269	0.619	0.392
A20		Child Care First Aid Level 3	0.507	\$223,200	0.458	0.574	0.466	0.374	0.39	0.619	0.448
A3		Adult/Infant/Child CPR Level 1	0.473	\$54,000	0.511	0.572	0.466	0.438	0.308	0.376	0.589
A6		First Aid	0.388	\$44,640	0.324	0.491	0.245	0.116	0.188	0.619	0.17
A7		Infant/Child CPR	0.335	\$43,920	0.287	0.334	0.244	0.293	0.22	0.476	0.213
A19		Child Care First Aid Level 2	0.329	\$148,800	0.329	0.376	0.326	0.229	0.22	0.37	0.268
A12		Child Care CPR Level 3	0.280	\$173,484	0.287	0.376	0.251	0.166	0.118	0.308	0.212
A1		Child Care CPR Level 1	0.279	\$57,828	0.29	0.361	0.271	0.156	0.118	0.308	0.212
A11		Child Care CPR Level 2	0.279	\$115,656	0.287	0.376	0.251	0.156	0.118	0.308	0.212
A2		Child Care First Aid Level 1	0.269	\$74,400	0.212	0.376	0.288	0.197	0.161	0.308	0.327
A5		Standard First Aid/AED	0.247	\$46,800	0.22	0.334	0.313	0.284	0.094	0.276	0.14
A9		First Aid-RTE (Responding to	0.238	\$29,160	0.195	0.24	0.688	0.509	0.067	0.124	0.41
A4		Adult CPR/AED	0.236	\$56,760	0.248	0.334	0.313	0.299	0.094	0.186	0.172
A8		CPR for Professional Rescuer	0.209	\$32,130	0.195	0.266	0.428	0.509	0.067	0.124	0.133

Figure 9. Measures of Contribution Prior to Normalization

3.4.1 Maximum Benefits Constrained by Costs

Figure 10 represents an Efficient Frontier table that explicitly indicates which projects are recommended for funding, assuming a progressively increasing budget. The approach is to fund projects starting with the highest benefit/cost ratio, and continuing until the \$900,000 budget depletes. For example, when the accumulated available funding is \$371,988, Project A2 (Child Care First Aid Level 1) is not funded. However, when the accumulated available funding increases to \$446,388, Project A2 warrants funding because of its derived benefit contribution. If the increases of funding continue, a different set of projects become are suggested for funding. For example, when the budget increases to \$574,788, Project A19 is now funded instead of Project A3.

	6,750	102,001	197,252	292,503	387,754	483,005	578,256	673,507	768,758	864,009	959,260	1,054,511
	10.4%	20.0%	29.6%	36.5%	42.4%	46.0%	48.0%	50.4%	52.2%	53.5%	54.0%	54.3%
	6,750	95,310	196,110	283,098	371,988	446,388	574,788	649,188	768,672	822,672	939,060	1,013,460
A1												
A11												
A12												
A13									FUNDED	FUNDED		
A17												
A18											FUNDED	FUNDED
A2						FUNDED						
A19							FUNDED					
A20								FUNDED	FUNDED	FUNDED	FUNDED	
A21												FUNDED
A3			FUNDED	FUNDED	FUNDED	FUNDED			FUNDED			
A22							FUNDED	FUNDED	FUNDED	FUNDED	FUNDED	FUNDED
A4					FUNDED	FUNDED	FUNDED	FUNDED	FUNDED	FUNDED	FUNDED	FUNDED
A5			FUNDED	FUNDED	FUNDED	FUNDED	FUNDED	FUNDED	FUNDED	FUNDED	FUNDED	FUNDED
A6		FUNDED	FUNDED	FUNDED	FUNDED	FUNDED	FUNDED	FUNDED	FUNDED	FUNDED	FUNDED	FUNDED
A7		FUNDED	FUNDED	FUNDED	FUNDED	FUNDED	FUNDED	FUNDED	FUNDED	FUNDED	FUNDED	FUNDED
A8					FUNDED	FUNDED	FUNDED	FUNDED	FUNDED	FUNDED	FUNDED	FUNDED
A9				FUNDED	FUNDED	FUNDED	FUNDED	FUNDED	FUNDED	FUNDED	FUNDED	FUNDED
A10	FUNDED	FUNDED	FUNDED	FUNDED	FUNDED	FUNDED	FUNDED	FUNDED	FUNDED	FUNDED	FUNDED	FUNDED

Figure 10. Increasing Budget (Efficient Frontier)

3.4.2 Benefits Optimized

The Resource Aligner function within Expert Choice produces the combination of projects that maximize the total benefits without exceeding budget. The allocation is formulated as a zero-one integer mathematical programming problem. Using this methodology and the solver, As illustrated in Figure 11, it resulted in allocating funding to Child Care CPR Level 4 project (instead of the highest level, Level 6) and maximum funding to the other nine projects.

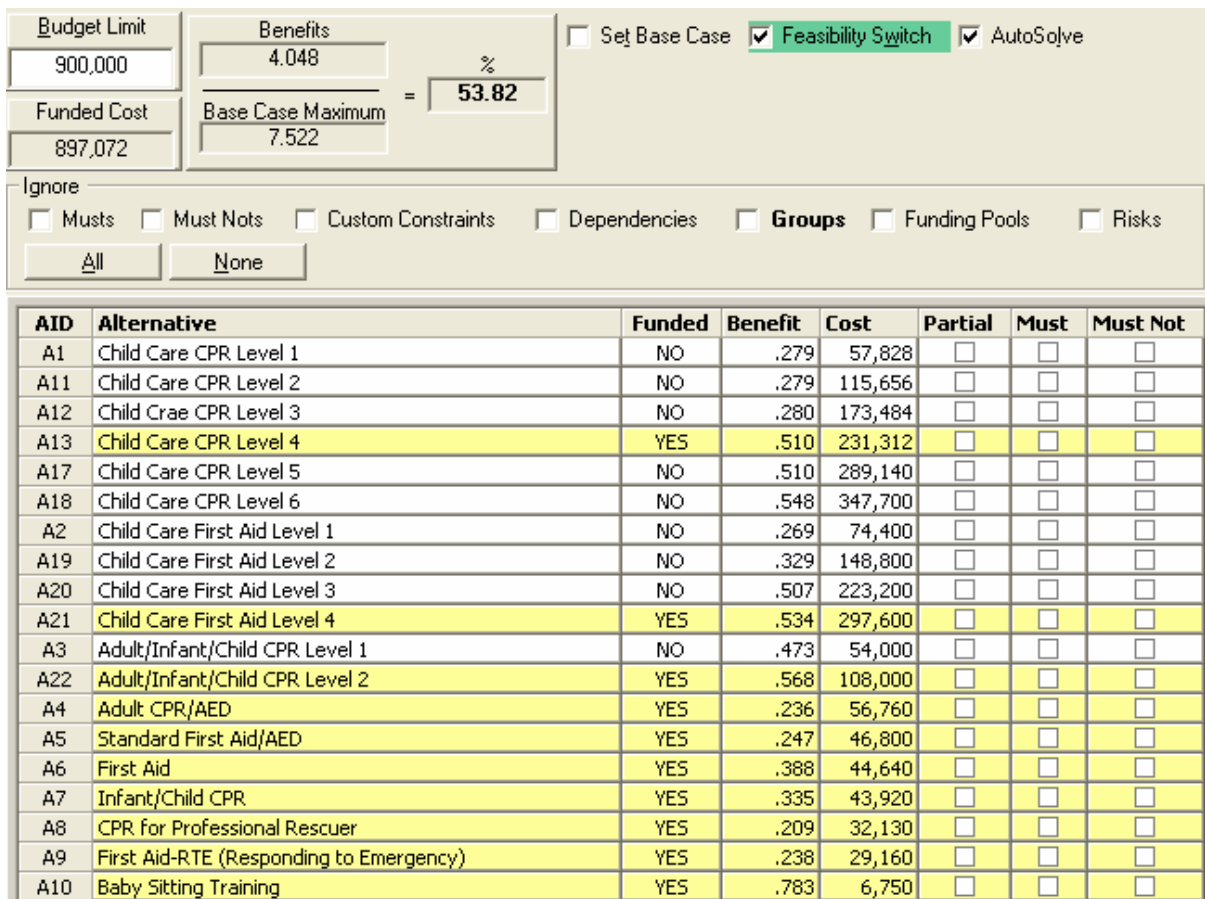


Figure 11. Optimized Allocation of Resources

4 SUMMARY

The project team from the Health and Safety Services department selected 10 life-saving training projects for delivery in CY2005, with a total cost of \$1,013,460. Since top management allocated to the department \$900,000 for the delivery of life-saving training in CY2005, the project team must decide which projects are funded. The project team made a rational decision in allocating the budget by implementing AHP in a top-down fashion, modeled in Expert Choice. The model represented an ALRA decision problem. Modeling activities consisted of team participants collectively structuring the problem and entering the structure into the model. Afterward, participants made paired comparisons individually that rated the importance of each project with respect to satisfying objectives. A five-scale intensity scheme (i.e. extreme, significant, moderate, some, and tad) was used by participants in making their ratings. Conclusions from the ALRA model are:

- All 10 projects are recommended for funding.
- Nine projects are allocated to the maximum funding level.
- One project is allocated at Level 4 (Child Care CPR Level 4) funding instead of the maximum funding, Level 6.
- Total project resource allocation is \$897,072.

In addition to successful resource allocation using the team's extensive experience in health and safety training and the assistance of Expert Choice software during the decision making process, it reduced the tension among employees that was created by low annual budget and the BOGSAT method of allocating resource in the past. It helped the team rationally determine which projects to fund based on each project's derived contribution to the organization's mission of teaching life-saving skills to the community. Kensington Company has the assurance that it selected the set of projects that maximize available resources.