STRATEGIC PLANNING, DESIGN AND IMPLEMENTATION

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SESSION ABSTRACT

In this session the papers focused on strategic planning, design and implementation using the AHP/ANP will be presented. The AHP/ANP is a powerful and flexible method for decision making, which help people set priorities and make the best decision when both qualitative and quantitative aspects of a decision need to be considered. This method can be applied in management, governing, education, design, allocation and distribution for strategic planning and making strategy decisions of high importance and responsibility. Using the AHP/ANP in strategic planning involves brainstorming the criteria and alternatives, connecting the criteria and alternatives according to ones best understanding, creating a structure in which to put the criteria and alternatives and their connections in a complete way, and prioritization of the influences on the outcomes to determine the best choice. Using the AHP/ANP in design requires a set of criteria and sub-criteria to create a structure that makes it possible to make a decision to select a best design to serve a certain function or functions subject to constraint. Implementation needs action strategies with their measures of effectiveness.

Key words: Strategic planning, strategy, design, structure, implementation.

A MULTICRITERIA JOB EVALUATION METHOD FOR A STATE BANK

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ABSTRACT

Wage management is an important task which affects the firm productivity in short term and the consistency of the firm's activities in long term. If an organization can't establish a fair wage policy among the personnel, there will be a conflict in the organization. Establishment of a fair wage policy can be achieved by job evaluation. Job evaluation is a technique which is used to determine relative importance of all jobs in an organization. Jobs are evaluated with respect to ability, responsibility, effort, job conditions factors etc. So, job evaluation is a multi-criteria problem for organizations. In this study, a job evaluation methodology is developed by using Analytic Network Process (ANP) for a state bank. The relative importance of evaluation criteria are determined by an ANP model. The relative importance values are used to grade jobs with respect to one another by using Libaratore scale. This new methodology has a positive effect on competence and effective performance management system.

Key words: Job evaluation, Analytic Network Process (ANP), multi criteria decision making, banking.

1. Introduction

Job evaluation is a multi-criteria and complex decision-making problem which takes into account numerous criteria and sub-criteria. In fact, many criteria affecting decision-making problems are in interaction with each other and it is vital to pay attention to these relationships among criteria in order to make the best possible decisions. On the other hand, ANP eliminates the necessity of modeling by sticking to hierarchical structure. It is possible for both workers and employers to understand the outcome easily. As evaluation is done by using a scale appropriate for the jobs in the enterprise, it enables the enterprise to develop its own evaluation system.

2. Literature Review

Job evaluation and/or wage management are discussed in many researches for years. In one of the earlier works (Leck, 1995), a study examines wage gap reduction among organizations is presented. Eraslan (2013) used Fuzzy AHP for wage management system. Job evaluation as the primal first analysis needs to be performed for wage management is discussed by Babic et al. (2009) and also by Spyridakos (2001). Spyridakos used UTA-II method in order to assess a consistent additive value model that allows the ranking of the jobs according to its relative importance.

3. Hypotheses/Objectives

Although there are various job evaluation methods in the literature, the degree of importance attached to the criteria used in evaluation may change from one enterprise to another. In the present study, ANP was used as it can exactly respond to the subjective needs of the enterprise and partially eliminate the inconveniences of the conventional methods. The characteristics such as its flexibility, its ability to find solutions to problems in a short time, its capacity to incorporate all kinds of interactions, dependency and feedback in the model and the opportunities it provide to evaluate all relationships systematically make ANP superior over the other methods.
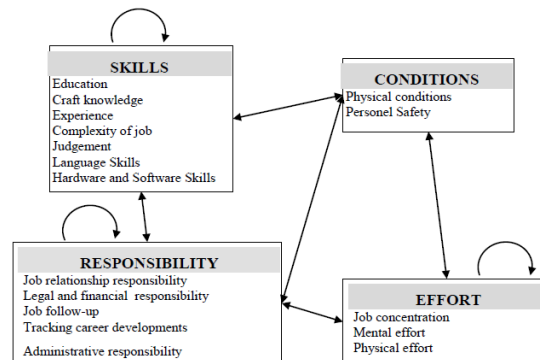
4. Research Design/Methodology

An ANP model has been proposed in order to determine the weights of the criteria and sub-criteria which will be used to evaluate the jobs in a state bank. Criteria and sub-criteria are adapted from "Job Grouping System-JGS" started to be used in 1982 in our country. 16 different banking jobs in a branch of a state bank were evaluated by four main JGS and 17 sub-criteria. 1000 total point was distributed among the criteria and sub-criteria in accordance with the weights obtained by ANP To determine sub-criteria levels for 16 different banking jobs, a questionnaire was prepared and filled out by General Director of the bank. The higher the total point obtained from the sub-criteria according to the degree of the job points out that the higher level of required qualities, responsibilities and abilities of the person who will perform that job.

5. Data/Model Analysis

The criteria and sub-criteria weights were determined through ANP (see the figure) and a total of 1000 points were distributed among the criteria and sub-criteria in accordance

with the weights to calculate the scores of each job. During the distribution of sub-criteria points among the criteria degrees, Liberatore scale (1992) was used.

6. Limitations

The software package 'Super Decisions' doesn't pave the way for making sensitivity analysis without an alternative cluster. This cluster consists of all the works in the enterprise. When all jobs in a big enterprise are evaluated using ANP, it is certain that pairwise comparisons are unreliable and therefore inconsistency occurs. For this reason, in the enterprises in which there are few jobs (less than 7), sensitivity analysis can be done by including alternative clusters in the ANP model. Under these circumstances, how the weight of the criteria and sub-criteria as well as the significance levels of jobs will change in case of a change in the weight of any criterion can be easily seen.

7. Conclusions

ANP has the is a flexible method which is easy to use. When there are new criteria in accordance with different job systems, these changes can easily be incorporated into the model. This enables related people to take part in the decision process. Moreover, the consistency ratios obtained through ANP prevent possible disagreements by providing people in and outside the enterprise with the necessary information about the reliability of the results of the study.

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AHP-BASED GROUP DECISION MAKING – CASE STUDY OF E-LEARNING IMPLEMENTATION IN PRE-TERTIARY EDUCATION

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ABSTRACT

In this paper we present overall methodology for strategic planning of e-learning implementation in education and put emphasis on the choice phase - group decision making with the AHP. Presented methodology combines e-readiness assessment, use of focus groups, the AHP and group decision making. It was implemented in Kosovo in the scope of EU-IT Pilot Project in the field of Education (EuropeAid/127855/D/SER/KOS) that was funded by European Commission. Strategic planning of e-learning consists of four phases: (1) Intelligence phase, (2) Design phase, (3) Choice phase and (4) Implementation phase. During the Intelligence phase the central problem was identified and situation analysis performed. Central problem was to find sustainable approach for enhancing quality of education in Kosovo. The most important tools in this phase were questionnaire for e-readiness assessment, case study analysis, SWOT analysis, focus groups and field research. Data that were gathered during e-readiness survey were very valuable for preparing the E-Readiness report. In the Design phase a lot of available documents and sources were analyzed. Analysis of proposed criteria/sub-criteria and alternatives essential for decision making on e-learning implementation was carried out. In the Choice Phase the criteria and sub-criteria clarified in the Design phase served as an input into the AHP model for calculation of priorityes needed for strategic planning of e-learning implementation. In this phase the second focus group meeting was held. The goal of the focus group was performance of group decision making with the AHP. Decision makers were teachers, students, municipality and the Ministry representatives. Obtained results served as inputs in the Action plan 2011-2015 for e-learning implementation in pre-tertiary education in Kosovo and the Recommendations for E-learning Strategy. The fourth phase involves building the Recommendations for E-learning Strategy and the Action Plan.

Key words: AHP, e-learning, strategic planning, e-readiness, strategy, action plan.

1. Introduction

E-learning is still used very sporadically in developing countries. Paradox is that in these countries possible impact of e-learning implementation could be exceptionally positive because it can provide basic education as well as advance lifelong learning opportunities to a large number of poor students. It is essential to carefully perform strategic planning of e-learning implementation in developing countries. In this paper we present overall methodology for strategic planning of e-learning implementation in pre-tertiary education and put emphasis on the choice phase - group decision making with the AHP. The Kosovo's case study has been also presented in the paper.

2. Literature Review

There are studies that identify critical success factors that influence of e-learning implementation in developing countries (Bhuasiri et al., 2012; Selim, 2007) but usually they findings in one developing country cannot be directly applicable to another context. The Kosovo case study has been prepared in the scope of EU-IT Pilot Project in the field of Education (EuropeAid/127855/D/SER/KOS) that was funded by European Commission. The objective of the Pilot Project was to support the Kosovo Government in improving the quality and efficiency of education through support in introducing ICT technology in the teaching and learning process. Authors of this paper worked in the period 2010-2011 as senior experts in the project and were in charge of preparation of methodology for decision making and e-readiness assessment as well as e-learning strategy development. The complete set of abovementioned documents can be found on the project web site (EU-IT PILOT PROJECT). The overall approach to strategic planning of e-learning implemented in Kosovo case had been tested before on decision making on e-learning implementation in high education in Croatia (Begicevic, Divjak, Hunjak, 2007).

9. Research Design/Methodology

The methodology for strategic planning of e-learning implementation in pre-tertiary education combines e-readiness assessment, focus groups, the Analytic Hierarchy Process (AHP) and group decision making. Strategic planning of e-learning implementation consists of four phases: (1) intelligence, (2) design, (3) choice and (4) implementation. During the Intelligence phase the central problem is identified and situation analysis performed. The most important tools in this phase were questionnaire for e-readiness prepared by the Centre for International Development (CID), case study analysis, SWOT analysis, focus groups and field research. Data that were gathered during e-readiness survey were very valuable for preparing the E-Readiness report for Kosovo. The main instrument for collecting data for e-readiness of Kosovo pre-tertiary education for implementing e-learning was the questionnaire that was based upon Harvard University Guide prepared by the Centre for International Development. There were 113 schools evaluated (almost 18% of schools). In the Design phase a lot of documents and sources were analyzed. After background research, analysis of proposed criteria/sub-criteria and alternatives essential for strategic planning and decision making was carried out. In this phase the first focus group meeting was held. Focus groups were introduced as an information gathering technique for e-readiness assessment of e-learning implementation in Kosovo schools, and as a valuable research tool for in-depth

qualitative research of state of the art of ICT use in education as well as essential input for building decision model for E-learning Strategy and Action Plan. There were 14 participants from Kosovo in the first focus group meeting. We had representation of teachers (university level and secondary and primary school), students (university and secondary school), and representative of decision-making authority (Ministry of Education), Didactic Centre, and technical support experts. In the scope of introduction to strategic planning of e-learning, four alternatives were discussed and criteria and sub-criteria that must be fulfilled were considered. In the Choice Phase the criteria and sub-criteria clarified in the Design phase served as an input into the AHP model. The AHP model is used for calculation of priorities needed for strategic planning of e-learning implementation. In this phase the second focus group meeting was held. In this phase the second focus group meeting was held. The goal of the focus group was performance of group decision making with the AHP. Decision makers came from Kosovo educational system and there were teachers from primary and secondary schools, students, technical support staff, didactic center, municipality and the Ministry representatives. In the decision making process 9 participants were involved. Further, PCs were prepared and equipped with appropriate software (ExpertChoice) that support decision making based on the AHP and participants were divided in two groups - one for primary schools and one for secondary schools. The main goal of the group decision making were calculation of priorities of criteria and sub-criteria in strategic planning of ICT and e-learning implementation in pre-tertiary education in Kosovo. The results served as inputs in the Action plan 2011-2015 for e-learning implementation in pre-tertiary education in Kosovo and the Recommendations for E-learning Strategy in Kosovo. The fourth phase of the methodology involves integration of findings and building the Recommendations for E-learning Strategy and the Action Plan. In this phase the E-learning action plan was developed based on the priorities obtained from the conducted group decision making supported by the multi-criteria decision making model.

10. Data/Model Analysis

The results of pair-wise comparisons, the hierarchy tree with relative significance of criteria and sub-criteria obtained from all participants is presented in Figure 1. Additionally, the participants of decision making process, as a final goal of the implementation of e-learning, choose blended learning alternative. It is not surprising that the highest relative significance has *Human Resource Development* and that it is closely followed by *Infrastructure* because lack of adequate human resources and even basic infrastructure for implementation of e-learning in Kosovo. It is evident that for primary and secondary school the most vital priority is to develop capacities of teachers, students and administrative staff for implementation of e-learning. Teachers should be trained in ICT skills but also in pedagogical aspects. Further, *Organizational and legal readiness* has the third place in the combined hierarchy tree. Decision makers, especially teachers and representatives of authorities, recognized criterion that incorporating financing, monitoring and legal framework as one of crucial for sustainable implementation of e-learning in Kosovo. For realization of this criterion, adequate department at the Ministry level has to be responsible. The criterion *Centre for E-learning Establishment* was ranked as fifth in the hierarchy tree obtained from the group decision making. The mission of the Centre can be to support schools, authorities and other interested parties in process of implementation of e-learning by means of training opportunities, central equipment and

services as well as standardization and quality assurance system. Finally, but still important, *Wider e-Learning Environment*, found its place in the Decision Making Model.
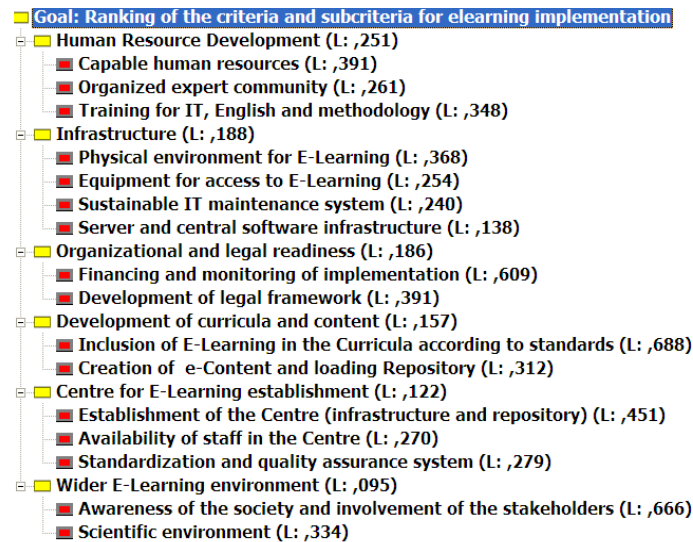
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Goal: Ranking of the criteria and subcriteria for elearning implementation
  Human Resource Development (L: ,251)
    Capable human resources (L: ,391)
    Organized expert community (L: ,261)
    Training for IT, English and methodology (L: ,348)
  Infrastructure (L: ,188)
    Physical environment for E-Learning (L: ,368)
    Equipment for access to E-Learning (L: ,254)
    Sustainable IT maintenance system (L: ,240)
    Server and central software infrastructure (L: ,138)
  Organizational and legal readiness (L: ,186)
    Financing and monitoring of implementation (L: ,609)
    Development of legal framework (L: ,391)
  Development of curricula and content (L: ,157)
    Inclusion of E-Learning in the Curricula according to standards (L: ,688)
    Creation of  e-Content and loading Repository (L: ,312)
  Centre for E-Learning establishment (L: ,122)
    Establishment of the Centre (infrastructure and repository) (L: ,451)
    Availability of staff in the Centre (L: ,270)
    Standardization and quality assurance system (L: ,279)
  Wider E-Learning environment (L: ,095)
    Awareness of the society and involvement of the stakeholders (L: ,666)
    Scientific environment (L: ,334)
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Figure 1 The hierarchy tree with relative significance of criteria and sub-criteria

11. Conclusions

The recommendation based on the obtained results is that e-learning is implemented gradually, using step by step approach and progress from stages with less intense use of e-learning to those with increasingly greater utilization of e-learning possibilities. In that process a special attention should be paid to a considerable difference in absorption capacity for ICT application between primary and lower secondary schools on one hand and upper secondary on the other, as well between schools from bigger cities and those from rural areas.

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DESIGN AND PRIORITIZATION USING THE AHP

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ABSTRACT

This paper is concerned with the development of a general and possibly comprehensive structure for design. Any design must meet a set of criteria and sub-criteria to create a structure that makes it possible to make a decision to select a best design to serve a certain function or functions subject to constraint. What we emphasize in our paper is the need to include all the factors in the decision that have significant bearing on the outcome so that the result is in principle optimal in the face of all the compromises needed. Because design is a complex decision process, and as all multicriteria decisions require a structure to make it possible to apply judgments and derive priorities, we designed a generic structure to draw upon and specialize for particular designs. The need for prioritization forces us to connect these factors according to their interactions in order to compare them and prioritize them for resource allocation and for sequencing the actions required that lead to implementation. In the paper the general model of design problem is presented and two examples are given. We explain the use of a general model in the design phase on the complex example of planning and designing of a mousetrap. To validate how the general model works on a simple problem in the post-design phase we give an example of the laptop security mechanism problem. We believe that our approach to design presented in this paper is a fundamentally new approach that has not been considered in this kind of generality before.

Key words: Design, prioritization, Analytic Hierarchy Process (AHP).

1. Introduction

Design is a pattern, structure or framework with a purpose, underpins every form of creation from objects such as chairs to the way we plan and execute our lives. For this reason it is useful to seek out some common structure that can be applied to any kind of design, whether this be for computer games, consumer products, one's own personal life or any process in any system. A design plan involves brainstorming the design criteria and alternatives, connecting the criteria, and prioritization of the influences on the outcomes to determine the best choice. To design a system, we must think of systems in terms of four major attributes: purpose, function, flow and structure. The purpose of a system designed by people is, on the first level given to it by the designer. Later the users of the system adapt it to their own purposes. In this sense, a system should always be considered in the context of its users rather than of its designers. This paper is concerned with the development of a general and possibly comprehensive structure for design. It is certain that this is a beginning and not the final prototype design structure. Indeed, because of the interaction of the possible design alternatives with the criteria, we believe that they must meet the ultimate structure needs to be in the form of a network with cycles and interdependencies that properly distribute the influence. This will be our concern in a follow up paper on the subject.

2. Literature Review

There are some researches related to design a specific product and/or process but no one leads a general approach that could be used for every kind of design problem, for the pre-design phase. Every design problem begins with an effort to achieve fitness between two entities: the form in question, is the solution to the problem, and its context or constraints define the problem. In other words, when we speak of design, the real object of discussion is not the form alone, but the ensemble comprising the form and its context. [Alexander, 1974]. Design constraints are limits imposed on the design criteria. Dino Dini [2005] says that the design process can be defined as the management of constraints. He identifies two kinds of constraints: Negotiable and non-negotiable. So far the factors needed in design have been organized as a list for one to study by different researchers. But the need for prioritization, forces us to connect these factors according to their interactions, could not have considered before.

3. Research Design/Methodology

Here we construct a hierarchy to represent all the factors, methods and constraints that play role in the design process, then we provide an example which uses this structure on its own design phase.

4. Data/Model Analysis and an example- designing "Laptop Security Mechanism"

The following hierarchy of Figure 1 depicts the design phases, criteria, methods and constraints which play a major role in all the far flung uses of design. To validate how the general model works on a simple problem, we give an example of the laptop security

mechanism problem. The general model of design problems (Figure 1) and the AHP was used to validate the laptop security mechanism products, Figure 2 gives the developed single network ANP model. We have compared three security mechanism.
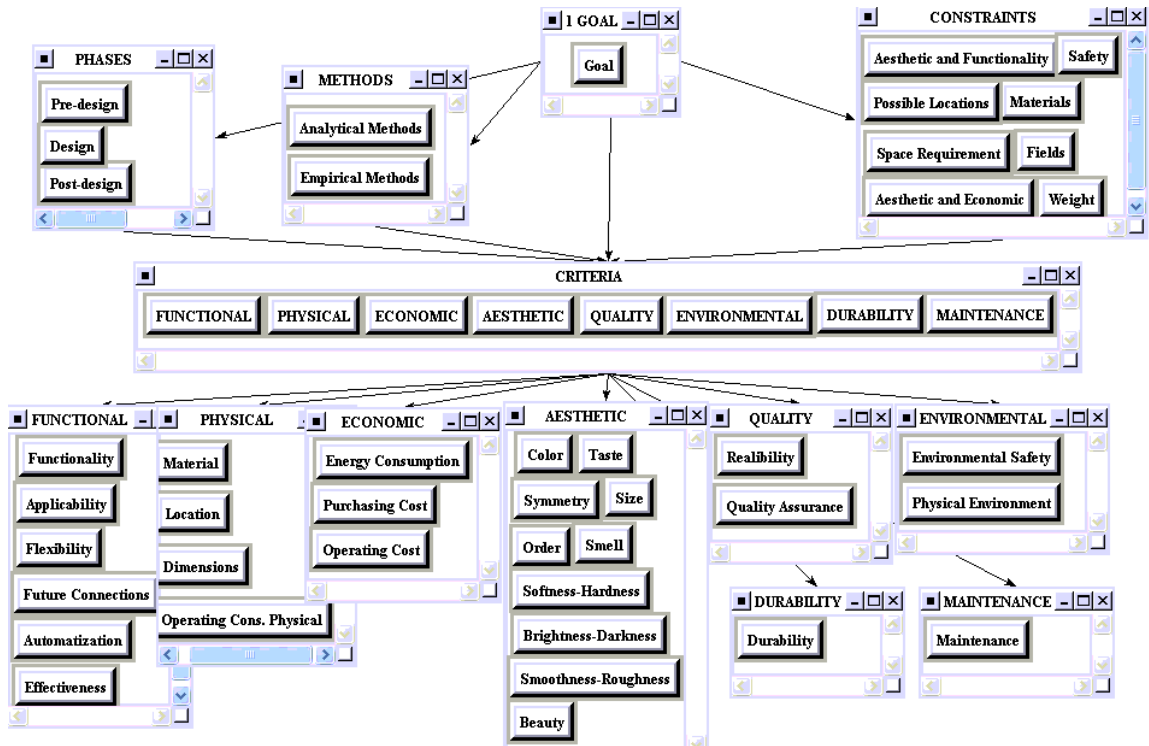

Figure 1 General Model of Design Problem

The overall priorities of the criteria and the general outcome are shown in Table 1 and 2 respectively. These results are design directions in the revision phase of post-design.
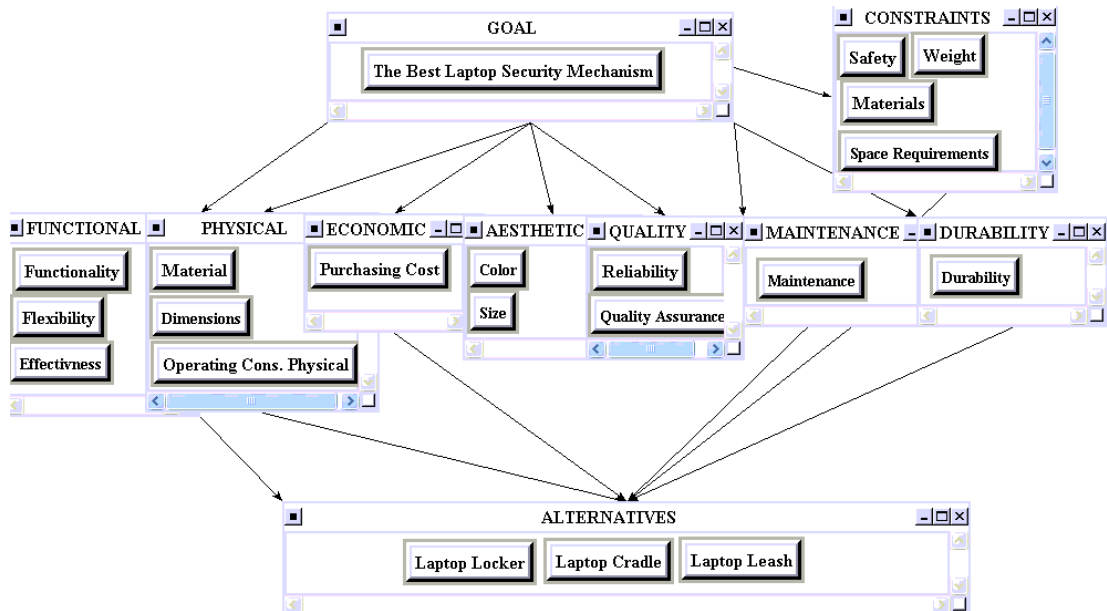
Figure 2 Laptop Security Mechanism Model

Table 1 Overall Priorities of the Criteria and Sub-criteria

CRITERIA	PRIORITIES	SUBCRITERIA	PRIORITIES (Normalized by cluster)	PRIORITIES (Limiting)
FUNCTIONAL	0.247972	Functionality	0.52785	0.065446
		Effectiveness	0.33251	0.041227
		Flexibility	0.13964	0.017314
CONSTRAINTS	0.192553	Safety	0.54354	0.052330
		Weight	0.17594	0.016939
		Space Requirement	0.15663	0.015080
PHYSICAL	0.143416	Materials	0.12389	0.011928
		Dimensions	0.20981	0.015045
		Operating Cons.Physc.	0.54992	0.039433
QUALITY	0.106010	Reliability	0.66667	0.035337
		Quality Assurance	0.33333	0.017668
MAINTENANCE	0.103852	Maintenance	1.00000	0.051926
ECONOMIC	0.092846	Purchasing Cost	1.00000	0.046423
DURABILITY	0.067327	Durability	1.00000	0.033664
AESTHETIC	0.046024	Size	0.66665	0.015341
		Color	0.33335	0.007671

The priorities of the alternatives are shown in Table 2.

Table 2 Overall Outcome

Alternative	Normal	Ranking
Laptop Locker	0.415450	1
Laptop Cradle	0.327762	2
Laptop Leash	0.256789	3

5. Conclusions

We explain the use of a general model in the design phase. To validate how the general model works on a simple problem in the post-design phase we give an example of the laptop security mechanism problem. We believe that our approach to design presented in this paper is a fundamentally new approach that has not been considered in this kind of generality before.

6. Key References

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