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*Araştırma Makalesi ● Research Article*

# An Overview of the Planned Obsolescence Paradigm: Evaluation Via Multiple Criteria Decision Making Methods for The Sectors in Turkey*

*Planlı Eskitme Yaklaşımına Genel Bir Bakış: Türkiye'deki Sektörlere Yönelik Çok Kriterli Karar Verme Yöntemleriyle Değerlendirilmesi*

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ÖZ

Çalışma kapsamında planlı eskitme (PE) paradigmasına genel bir bakış sunulmaktadır. Çalışmanın temel amacı, üretim/hizmet sektörlerinde planlı eskitme yaklaşımına neden olan tüm kriterleri belirlemektir. Bu kriterlerin planlı eskitme pazarlama taktiğine bağlı etki derecelerini tespit etmek ve değişkenlerin öncelik sırasını ortaya koymaktır. Bu ilişki seviyelerine göre planlı eskitmeye sebep olan tüm kriterler tespit etmek, bu paradigmanın pazarlama taktiğin uygulanmasının sektörler arasındaki öncelik sırasını belirlemek ve bu pazarlama stratejine bağlı durumu ortaya koymaktır, bir model geliştirmektir. Tespit edilen değişenlere yönelik anket soruları hazırlanıp, sektördeki uzmanlara sorulmuştur. Her sektördeki 150 uzmandan yanıt alınmıştır. Çalışmanın amacına yönelik anket sonuçların analiz ve değerlendirmelerine bağlı ÇKKV yöntemleri kapsamında sektör öncelik sıralamasını yapmak ve PE paradigmasına en uygun sektörü belirlemek için model oluşturulmuş ve bir seçim problemi için AHS ve AAS yöntemleri kullanılmıştır. Analiz değerlendirmeleri için ÇKKV yöntemlerinde zamandan tasarruf sağlamak amacıyla sırasıyla AHS ve AAS'ye göre hesaplamaları yapan ve en uygun sektörü seçen Expert Choice ve Super Decisions yazılım programları kullanılmıştır.

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ABSTRACT

The purpose of the study is to determine the degree of influence and the order of priority of these criteria according to Planned obsolescence (PO) (marketing strategy). It is also to analyze the relationships between the determined variables and all possible sectors. The other purpose is to determine the order of prioritization of PO paradigm among sectors and to present the evaluation which is related to PO and to develop a model. Survey questions were prepared for the identified criteria of PO and experts of the sectors were asked and 150 experts from each sector were answered. A model was formed in order to make the sector prioritize by MCDM methods and to determine the sector which is most convenient for the PO. In MCDM, in order to save time, Expert Choice and Super Decisions were used which perform calculations and define the most convenient sector for PO based on AHP and ANP respectively.

## 1. Introduction

Planned obsolescence (PO), described as a technique of ageing or appearing to be readjusted items, is a phenomenon that causes customers to evaluate sales – pushing the fashion world on its own (Guiltinan, 2008). Although few clothing consumers perceive this strategy, it influences their daily life

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and behaviors of buying. It is indeed a strategy whose objective is to encourage the use of substitute sales and this is achieved by reducing a product's lifespan. This one is achieved mainly from two ways-actual product changes, named physical obsolescence, or developed product understanding alterations, named technical obsolescence (Guiltinan, 2008).

Philip Kotler, a marketing guru defined that much so-called planned obsolescence is the strategy of the rivalry and technological development powers in a free organization which the strength that direct to ever-developing products and services (Planned obsolescence, www.economist.com, 2015). It is worth issue pointing out that expected obsolescence is a marketing strategy embedded in that as well. There has been significant physical and technical obsolescence in both. Mentioned, and an interesting issue reached – it is the cooperative element of technological obsolescence that causes consumer transactions (basically purchases) so simple, and therefore supports the policy. Technical obsolescence could be something of a production phenomenon that relies on real practical design improvements, but it's crucial to note that a transition in processing will not encourage the selling itself. A consumer sales is compelled for both physical and technological obsolescence via the marketing – by educating the consumer (Joy et al., 2012) via advertising and promotions. In addition, although still a production technique, expected obsolescence as an ultimate method for the selling of a commodity is made feasible by advertisement. Customers could readily detect physical obsolescence, so products that display, it will rapidly become uncompetitive. Technological obsolescence is exclusively marketing tactics within itself – the inventive persuading of consumers which their sale is compulsory.

This PO approach is provided inspiration by Bernard London in 1932 with his study "Ending the Depression Through Planned Obsolescence". The aspect of the purpose of London would support the government enforce a lawful obsolescence on consumer papers, to guide, motivate and maintain consumption. Planned Obsolescence is symbolized with a restricted lifecycle time via the planned design and processing stages of products to cause purchasing again (London, 1932; Stevens,1960; Waldman, 1997). This business strategy is called "Planned obsolescence (PO)" that defines a product which does not have stylish, fashionable or utilizable features is constructed materials as part of a whole from its formation of a thought (Waldman, 1996).

The detailed critics of planned obsolescence explained by The Macquarie Dictionary (2005) like that he emphasizes the policy as the internal policy of producing a stuff (good) arrive rapidly end of lifecyle (out of date) and unserviceable situation via including minor properties, functions of a model in order to guarantee constant sale of new model products (Rauscher and Momtaz, 2014).

Brooks Stevens describes planned obsolescence as encouraging the consumer demand, desire to have products, stuff or something a little newer, a litter functional, a little fashionable, a little sooner than is essential concept (Industrial Designers-Brooks Stevens, 1960; Glenn, 2003).

The first explanation of PO in “The Waste Makers by Vance Packard” where he has decomposition of different kinds of planned obsolescence both with the assessments in associations. The PO is practically conclusion of a paradigm with some estimations faiths and summarize like "If goods do not wear out faster, factories will be idle, people will be unemployed”. The book is titled "The waste makers" was printed, publicized in the 1960s and begin to reveal the social, ecological and environmental degeneration resultinf from disposal, wasteful association and PO in products (Packard, 1960). Hyper consumerism, overconsumption conducted by PO originates amount and diversities of harmful and solid disposals, and wastes compelling an efficient waste management. Waste issues are exacerbated according to globalisation which supports potential growth and increasing of international waste commerce (Leonard, 2010).

Ink cartridges are produced that contains with fix smart chips on them by a lot of companies which could not be printing when one of the colors decreases to a fixed level, if Ink cartridge has enough ink to print. In addition, Refilling or using third party ink could be supported via the smart chips (Gramatyka et al., 2007; Dannoritzer, Planned Obsolescence Documentary, 2014). The promise of mobile technology would undoubtedly contribute to development in the world consumer electronic industry with higher spending on web-based content and growing demand for network data. This opposing process causes basically two effects: As a global community, we are progressively relying on ICT (Information and Communications Technology) and Web-based resources every day due to numerous factors, apps, particularly IoT (Internet of Things)-based and smart goods (products). The development and construction strategy of items with a verifiably defined usable life is considered to be a standard activity for numerous multinational organizations. This "Planned Obsolescence" design approach could be identified when a product is deliberately planned to have a very limited life span, because consumers would have to make repetitive transactions The prospect of billions of connected devices being obsolescent per year is troubling and is given market pressures, obviously some research needs to be done about how to mitigate this effect 's effects. Recent years have seen the rise of trends such as "Degrowth" and one of its advocates, Serge Latouche claims that existing demand rates are now unsustainable for the global economic system (Bulow, 1986; Demaria, 2013; Latouche, 2015).

The world’s oldest light bulb, which has now been continuously operating for 111 years (till 2012). The bulb has outlived three of the security cameras that are used to monitor it. In addition to this fact, Some of advantages, and disadvantages for customers and economics are represented below appropriately (Beder, 2000). If users return to the

early 20th century, the famed "Phoebus Cartel" was one of the first examples of a agreement to regulate the production and distribution of their goods between various light bulb manufacturers. The so-called "Cartel" announced a decrease in light bulb longevity and at the same time created a non-competition arrangement among subscription companies to expand sales of new light bulbs and thereby guarantee a profitable industry for member businesses. Consumerism is a social, economic Structure and an ideology that fosters the purchase of products and services in growing quantities according to Mahajan. Bugas claims that the word "consumerism" is the true boss and beneficiary of the American system on Mr. Consumer's side. Consumerism can be perceived as a preface to obsolescence in accordance with these descriptions. So if more is needed, the amount of sales increases and consumption ultimately leads to involvement service market obsolescence (Krajewski, 2014; Mahajan, 2015).

Eventually, a limited number of research studies might be categorized as beneficial fundamental research and it might be focused on hypotheses or concepts of design to counter obsolescence. Meyer et al. in particular suggested a framework to develop a life risk reduction obsolescence timetable service for long-term systems or advanced electronics. They acknowledged the need to provide the lowest-cost solution for consumers, distributors and device manufacturers to provide a strategy to obsolescence management covering every part of the product life cycle from design, manufacturing to functional in-site support and end-of-life cycle-up. Similarly, Cuculoski concentrated on the techniques of obsolescence management that must be agile, scalable and capable of offering many pathways to the final achievement. Several primary feature points such as expenses have been established. Active equipment management without compromising system efficiency, quality and durability must be adequately agile to meet any future functionality requirements improvements (Cuculoski, 2013; Meyer et al., 2004).

Disadvantages for Manufacturers: increased the ratio/proportion of dissatisfaction from consumers, customers, Legal reification, causing damage prestige, reiteration/ channels of mass communication of guarantees safety against potential harm and damage.

Disadvantages For Customers: tending to contest consumption- “keeping up with the Jones”, required and compelled into permanent, continuous consumption cycles, existent replacement or increasing and improving expenditure/costs, apply force to consume from advertising and media.

Advantages for Economics: Mass Consumption, Cost diminishing by using cheaper parts, increasing sales in markets. Very important constraint: the product deterioration must not be noticed by the customer.

Disadvantages for Economics: For instance, some 15 billion of act of buying capability lost by shortening the life cycle span of the product/service in Austria per year (Baran and Sweezy, 1966).

## 2. Why Is Planned Obsolescence a Problem?

Strategy of PO is opposed to the conception of sustainable improvement and also does not encounter consumer needs in terms of the quality of the good and the time period of their process stages of operation. Generally advocated sustainable improvement strategy policy should be a priority for innovation, development and economic competitiveness. The policy of PO should be replaced by environmental and ecological awareness, and its negative effects on the environment should be reduced. Engineers should work on the products that are ecological life friendly as well as robust durable, and have less waste during the producing, stages of operation and recycling with reference to the regulation of product and construct to minimize the volume of the disposal (Sakiewicz et al., 2012).

PO is a very vital paradigm for environmental impacts. All resources are limited, some more than others, because everything produced originates from nature. Producing unequal treatment as consumers do not know the lifetime of the products they buy and could not control them. It ensures that wasteful society is promoted.

In the innovative industry, technology and invention are at the driver's seat, and marketing, which must comply with its often erratic timing, relies heavily on technology development and the segmentation of its purchasing public for success. However, the studies show that when the business progresses and slows down, marketing takes power and by combining analysis with sales, uses research and development to achieve marketing needs rather than its own technical drives. The marketing strategy is a challenging of trying to maximize decision making that, in practice, must be taken in the forehead of wildly differing risk and uncertainty. As a result, the strategies of various companies and individual companies in the sectors vary based on the major component of the uncertainty they face in carrying out their marketing operations. Improving the commodity is focused on the background of any dynamic marketing strategy. Industries in which productivity improvements is relatively gradual, as in the case of many customer soft goods, often seem to be forced to simulate technological improvement through changes in design and packaging. Other businesses are not allowed the luxury of this relatively orderly and systematic based on product policy. The aerospace industry, who are just beginning to attract management attention due to the increasing volume of sales of industries, is an outstanding demonstration. Logical divisions arising from these differences are (i) practical innovation related to product functionality and reliability characteristics and (ii) esthetic development related to the psychological effects of improvements in design and packaging. Functional advancement may or may not also require aesthetic innovation, whether or not the change affects the product 's features. A durable change could

involve a corresponding change of design to persuade buyers that a development had definitely taken place (Nelson, 1959; Allison, 1961; Levinthal and Purohit, 1989; Waldman, 1993; Satyro et al., 2018; Kuppelwieser et al., 2019).

## 3. Evaluation Planned Obsolescence-Via Multiple Criteria Decision Making Methods for The Sector in Turkey

Lots of studies are performed simultaneously with restricted, defined criteria and selection convenient sectors in every scope of industry and service sectors. In such environment, this situation is very significant to assign and determine the most convenient criteria of shortening the lifecycle span of products/services to the most appropriate sectors (manufacturing and service sectors) in terms of grouping and matching the criteria/properties of the product/services with the convenient sectors.

In order to solve this issue of selection the convenient sector for the implementation of this case and to enable the criteria and the flow of sectors within the criteria of shortening the life cycle time of products efficiently.

With the support of the research area in this study, some criteria were regulated in standardize the industrial products to assign suitable sectors and industries to the manufacturing or services. By means of these and other criteria due to the literature surveys and questionnaires determined, Multi Criteria Decision Making (MCDM) methods were examined to select the most convenient sector in this implementation area where there are more than one alternative.

Within the methodology of MCDM, a model was established to select the most convenient sector and the methods namely Analytic Hierarchy Process (AHP) and Analytic Network Process (ANP) were applied to a selection problem. In MCDM methods, so as to save time, software programs namely "Expert Choice" (ExC) and "Super Decisions" (SuD) were used which perform calculations and chosen the most suitable sector based on AHP and ANP respectively.

In MCDM field, there are lots of beneficial articles. Various kinds of MCDM techniques were mentioned (Daşdemir and Güngör, 2002). Application of AHP in project management which tells about how to implement AHP was made (Al-Harbi, 2001). In decision of marketing distribution in mobile communication sector, AHP and ANP were both applied and the results were compared (Felek et al., 2002). In order to select the best software, fuzzy AHP was applied (Başlıgil, 2005). Performance measurement of suppliers in automotive industry was evaluated with the application of fuzzy AHP (Akman and Alkan, 2006). Assessment of harmful waste transportation firms via appliying fuzzy AHP extent analysis method were also mentioned (Wang et al., 2009). In a supplier selection problem, ANP was applied (Gencer and Gürpınar, 2007). Fuzzy ANP was implemented to define failure condition and risk items around the work system (Dağdeviren et al., 2008). Since the main solution approach Planned Obsolescence of products/services in manufacturing and services sectors is an expansive structure, this is required to base on some nearer perceptions under the Life Cycle assessment construct and is required to apply these perceptions in detail. For this objective, this research is divided into two main parts namely the criteria of planned obsolescence assessment and MCDM methods.

In this first part, all probable criteria of assessment of lifecycle span of products/services are determined with experts and consensus in these scope, sectors and also the literature surveys which enables the sectors, industry to match the criteria of this concept effectively.

Among mentioned MCDM methods, ANP was chosen according to the adaptable construction with the framework of the selection issue and the survival of a benefit software program to accomplish its mathematical computings. Moreover, the constraints in the alternative method were described with illustrated example in detail.

The objective of this application of the research is to rank the criteria due to priority and to determine whether the appropriate criteria have been chosen or not and which criteria most important for lifecyle time and which the sector is the priority for these criteria of the lifecyle expectancy.

Firstly, we have considered the selection criteria to observe the appropriate criteria for the sectors (services and production-industry). After then we concluded the beneficial and appropriate ones due to theselected sector which are applied in literature parts with experts of manufacturing-services industry.

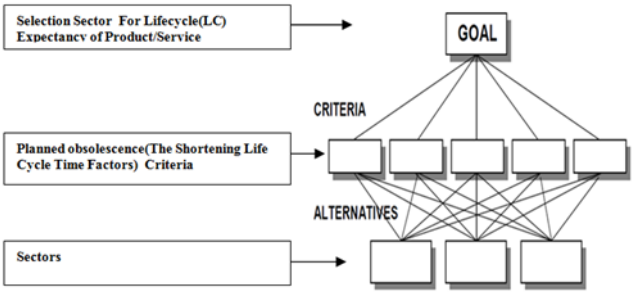
Secondly, the AHP structure was constructed by the criteria and sub-criteria which were observed in the first step. Criteria have been reevaluated by decision makers and experts of the sectors and customers (literature surveys) via linguistic values that can be explained in AHP calculator, Expert Choice program. Then, a degree of appropriate probability (Scale for pair wise comparisons) is suggested to compute the weights.

In the literature, there are various MCDM methods (Daşdemir and Güngör, 2002). But only small amount of them are appropriate for the structure of the selection problem. Also since this study will be a practical one, rather than only a theorical one, it is aimed to consider the MCDM methods which are accompanied with a software program for calculations. Because the mathematical calculations in MCDM methods are long-lasting when manually achieved, a software program will enable the scope of study to gain invaluable time during the selection process.

In the study as MCDM methods, it is mentioned about AHP and ANP. A real life problem is modeled that is related to selection of the most suitable sector to assess the life cycle span of products/services and solved based on these two methods. After comparison of the results, the use of one of the methods is suggested for the future decisions.

MCDM method for sophisticated and unorganized problems, a perception which applies a hierarchical structure acquiring levels of goal, criteria, possible sub-criteria, and alternatives (Belton and Stewart, 2002; Brugha, 2004; Figure 1).

**Figure 1.** Hierarchy for Selection Sector for LifeCycle (LC) Expectancy of Product/Service (Structure of Any Decision Hierarchy)




As its called applies AHP, examines the problem according to the hierarchical structure. At the highest of the hierarchy, there is a purpose which is influenced from simply decision factors which are taken part on the second level in hierarchy. If there are sub-criteria which can be on the third level in hierarchy, they are singular influenced from criteria. Certainly at the lowest of the hierarchical frame, there will be alternative choices which are only impressed from sub-criteria. In Figure 1, it is seen the structure of the decision hierarchy used in AHP (Holder, 1991; Saaty, 2003; Ishizaka and Lusti, 2006).

**Table 1.** Pair-wise Comparison Scale in AHP (Saaty, 1980; Saaty, 1990)

| Relative Intensity | Definition | Explanation |
|---|---|---|
| 1 | Equal importance | Two elements are of equal value |
| 3 | Slightly more importance | Experience slightly favor one element over another |
| 5 | strong importance | Experience strongly favor on element over another |
| 7 | Very strong importance | An element is strongly favored and its dominance is demonstrated in practice |
| 9 | Extreme importance | The evidence favoring one over another is of the highest possible order of affirmation |
| 2,4,6,8 | Intermediate values between two adjacent judgments | When compromise is needed |
| Rationales | Rationales Ratios arising from the scale | If consistency were to be forced by obtaining n numerical values to span the matrix |

According to Table 1, two decision elements are compared within the range of numbers 1-9. This scale is utilized for numerical correlations, comparisons. When the two decision elements are equally vital, important, the number 1 is used and one of the them is weakly more important than the other, the number 3 is used. The verbal comparisons are defined like that equal, moderate, strong, very strong, and extreme.

In addition to this, if the decision maker is indecisive whether the two elements are equally important or one of them slightly more important, in this case AHP suggests using the number 2. Numbers 2, 4, 6 and 8 are called intermediate values and they are used when a compromise is needed in pair-wise comparisons. The graphical view presents comparisons focused on the length of two bars. The analyzer chooses the desired condition (Saaty, 1977; Saaty, 1990; Saaty, 2003; Stam and Duarte, 2003; Omkarprasad and Sushil, 2006).

In this application, decision problem is modeled with decision main-criteria (after that, the word "criteria" will be used instead of main criteria), sub-criteria and alternatives. Alternatives are at the final stage of the hierarchical structure which are listed such as possible sectors in Table 2. All possible industrial sectors which are facilitated in Turkey, are determined according to the priorities and importance via lifecycle span of products/service (Life Cycle Assessment) is presented in Table 2.

The expeditor might follow the process together with the experts and persons who make the decisions to construct and model the problem , that could be separated into parts: goal (select the criteria and sector), criteria(supply-raw material), production, marketing(distribution) and its sub-criteria) and alternatives (industrial sectors and services in Turkey) (see Figure 1; Table 2 and Table 3).

**Table 2.** All Sectors are Located in Turkey such as Alternatives

| INDUSTRIAL SECTORS | | | |
|---|---|---|---|
| 1 | HEALTH SECTOR | 16 | ENERGY SECTOR |
| 2 | INSURANCE SECTOR | 17 | FOOD, BEVERAGE SECTOR |
| 3 | MANUFACTURING SECTOR | 18 | WHITE GOODS SECTOR |
| 4 | MINING INDUSTRIAL SECTOR | 19 | AUTOMOTIVE SECTOR |
| 5 | AEROSPACE DEFENSE AND SECURITY SECTOR | 20 | INFORMATION SECTOR(HARWARE AND SOFTARE SECTOR) |
| 6 | BANKING FINANCE SECTOR | 21 | MARKETING SECTOR |
| 7 | AIRLINE INDUSTRY | 22 | LODGING SECTOR |
| 8 | CHEMISTRY-PHARMACEUTICALS SECTORS | 23 | PUBLISHING INDUSTRY(BOOKS ETC PUBLISHING) |
| 9 | TELECOMUNATION SECTOR | 24 | ENTERTAINMENT SECTOR |
| 10 | TRANSPORTATION SECTOR | 25 | INTERNET PUBLISHING |
| 11 | EDUCATION SECTOR | 26 | METAL WORKING INDUSTY |
| 12 | AGRICULTURE SECTOR | 27 | LEATHER INDUSTRY |
| 13 | ADVERTISING SECTOR | 28 | TREE AND FOREST PRODUCTS SECTOR(FURNITURE SECTOR) |
| 14 | APPAREL -ACCESORIES TEXTILE SECTOR | 30 | CONFECTIONERY INDUSTRY |
| 15 | ELECTRIC-ELECTRONICS SECTOR | | |

Source: ISKI_Atiksularin_Kanalizasyona_Desarj_Yonetmeligi," İstanbul Hazırgiyim ve Konfeksiyon İhracatçıları Birliği "-"Türkiye'de Gelecek/Umut Vaat Eden Ve Cazibesini Kaybeden Sektörler Prof.Dr. Muammer Kaya Eskişehir-Osmangazi Üniversitesi", Teknoloji Araştırma Merkezi "http://www.everis.com/global/en-US/business-sectors/Paginas/listaus2.aspx", designed-modified by author)

**Table 3.** Dimensions-Criteria of Life Cycle Expentancy of Products/Services According to the Planned Obsolesence, designed by Author)

| CRITERIA | SUPPLY (RAW MATERIALS) | PRODUCTION | DISTRIBUTION (Marketing) | CRITERIA | SUPPLY (RAW MATERIALS) | PRODUCTION | DISTRIBUTION (Marketing) |
|---|---|---|---|---|---|---|---|
| SLOW FASHION (shortining fashion timeof products) | | | x | TECHNOLOGICAL ASPECTS (OBSOLESENCE) | | x | x |
| LONG TIME GUARANTEE | | x | | INNOVATION OVER | | x | x |
| CUSTOMIZATION | | | x | PRIVATE ENTERPRISE OVER GOVERMENT OPERATORS | x | x | x |
| MODULAR STRUCTURE | | x | | THE ENVIROMENTAL IMPACTS OF PRODUCTS\SERVICES (waste-polllutions-climate change) | x | x | x |
| LOCAL PRODUCTION | | x | | SOCIAL SUSTAINABILITY PROBLEM | x | x | x |
| DESIGN SERVICES,UNIQUE DESIGN | | x | | THE SOCIAL AND ENVIROMENTAL DEGRADATION (ECOLOGICAL IMPACT) | x | x | x |
| INTENSIVE UTILIZATION OR SERVICES FOR LONGER | | x | x | THE MORE ADVERTISEMENT | | | x |
| PRODUCT LIFE SPANS THROUGH BETTER QUALITY | | x | | CONSUMER UNDER PRESSURE TO PURCHASE AGAIN (PERCEIVED OBSOLESENCE) | | | x |
| PRODUCT SATISFACTION | | | x | CAPITALIST SYSTEM IDEA OF FREEDOM ( for a specific product) | | x | x |
| PRODUCT LIFETIME GUARANTEE | | x | | THE LEVEL OF UNNECESSARY WASTE OF THE SYSTEM | | x | x |
| EXTEND THE PRODUCT LIFESPAN (LİMİTED USEFUL LIFE-decreasing lifespan) | | x | | DURABLE GOODS | x | x | x |
| CUSTOMER SATISFACTION | | | x | PRODUCT RELIABILITY-QUALITY (creating Quality Difference) | x | x | |
| FASHION TRENDS | x | x | x | PRODUCT/SERVICE STYLE, BRANDS, BRANDS, IMAGE (Media) | | | x |
| FREE MARKETS OVER REGULATED MARKETS | | | x | INCREASING SALES FOR CULTURE, CURRENT SUSTAINABILITY | | x | x |
| HIDDEN ENGINE OF ECONOMY | | x | x | PRODUCT/SERVICE AFFORDABILITY | x | x | x |
| COST REDUCTION BY USING CHEAPER PARTS | | x | x | FUNCTIONALITY OF PRODUCTS/SERVICES | | x | |
| PRODUCT/SERVICE AGENCY -REPRESENTATION (solving the technical problems) | | | x | | | | |

The classification of the 33 criteria determined for evaluating product or service types with regards to their economic life-cycles 3 aspects of supply chain management system (*raw material supply, *production, and *distribution-marketing) demonstrates that the aspects of*production and *distribution-marketing are more important in evaluating the life-cycle of a product or service since they have the most criteria (see Table 3).

The classification demonstrates that the Production (23 criteria) and Distribution-Marketing (23 criteria) groups are more important than Supply group because of the higher number of criteria they include (see Table 3). In accordance with these decision components, the hierarchical structure depending the problem is given in Figure 2.

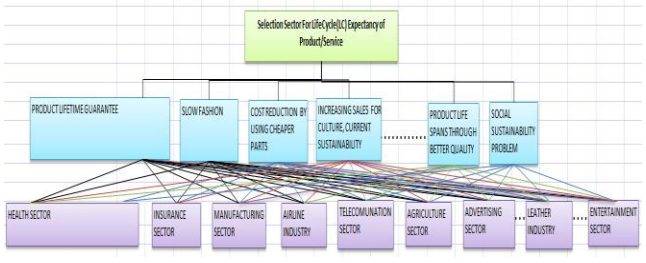
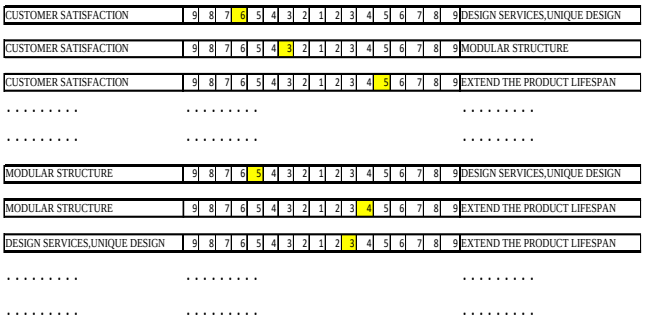



**Figure 2.** Hierarchy for Selection of the suitable Sector-Industry for Lifecycle Expectancy of Product/Service

Now comparison of decision criteria with each other in order to define their relative weights in the decision process will be handled. For this purpose, the experts of industrial sectors (manufacturing-services) are given a questionnaire, consensus which is related to pair-wise comparisons, to fill out as shown in Figure 3.

**Figure 3**. A Part of Questionnaire for Pair-wise Comparisons




In the comparisons in Figure 3, the expert assess the verbally means that, Modular structure is weakly more important than design services; unique design, customer satisfaction is strongly more important than design services; unique design and etc.

The matrix must be completely coherent so, the temporariness regulation, instruction Equation-Eq.(1) handles, influences for whole similarities (comparisons) aij:

$$a_{ii} = a_{ik} x a_{ki} \qquad \text{Eq.(1)}$$

Obtaining through reasoning the significant priorities must have a least consistency. In this way, a test is requirement

part for the original AHP application (Ishizaka and Lusti, 2006). Webber et al. (1996) and Vargas (1990) focus on that the similarities are joined for the comparison matrix might execute the suitable and significant assessments (judgements).

Equal to this mark, it was compared decision factors and calculated their associated weights. Comparing and weighting of the sub-criteria in phrase of their main-criteria could be calculated and holded in the similar way. All of the weights are given in Figure 4.

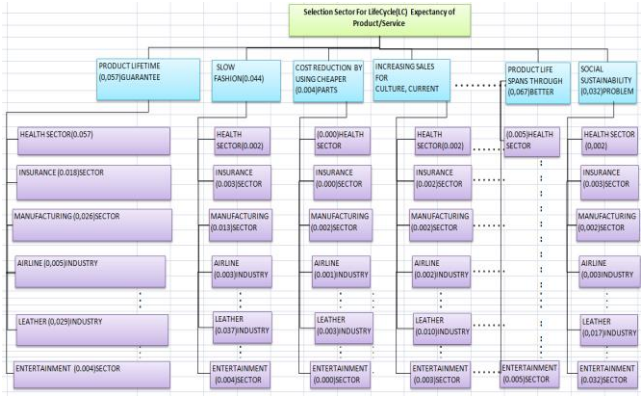



**Figure 4.** Relative Weights of All Decision Elements in AHP

Consisting with these weights, complex weights for every sector is computed and sectors are sorted by focusing on composite weights of alternative sectors. Composite weight for Health Sector equals:

*(0.057x0.057) + (0.044x0.002) + (0.004x0.00) + (0.018x0.002) + (0.067x0.005) + ⋯ + (0.032x0.002) = 0.388*

In the similar method, the combined weights for Insurance Sector, Manufacturing Sector, Mining Industrial Sector, Aerospace Defense and Security Sector, Banking Finance Sector, Airline Industry, Chemistry-Pharmaceuticals Sector, Telecommunication Sector, Transportation Sector, Education Sector, Agriculture Sector, Advertising Sector, Apparel-Accessories Textile Sector, Electrics-Electronics Sector, Energy Sector, Food, Beverage Sector, White Goods Sector, Automotive Sector, Information Sector, Marketing Sector, Lodging Sector, Publishing Industry, Entertainment Sector, Internet Publishing, Metal Working Industry, Leather Industry Health Sector and Tree and Forest Products Sector are 0,175; 0,416; 0,173; 0,252; 0,114; 0,175; 0,130; 0,185; 0,199; 0,104; 0,123; 0,258; 1,00; 0,751; 0,165; 0,118; 0,777; 0,678; 0,681; 0,259; 0,150; 0,273; 0,164; 0,196; 0,424; 0,667; 0,388 and 0,696 respectively. As shown in the bar chart in Figure 5, according to AHP, the most convenient alternative is Apparel-Accessories Textile Sector.

As it is seen from the above calculations, to perform these calculations manually takes a long time. Since the researcher, expert will be busy most of the time, performing such calculations is not practical job, also imagine the situation when implementer, researcher makes a mistake during the calculations of AHP, In order to save time when performing these calculations, a software program is extremely needed. For this propose, the use of ExC Software is suggested.

## 4. Application Of A Multi Criteria Decision Making Software Program-Expert Choice

Expert Choice is a software program developed for solving Multi Criteria Decision Making (MCDM) problems. Since it performs its calculations based on AHP, it makes pair-wise comparisons that are defined by decision makers and selects the best alternative with respect to calculations based on these pair-wise comparisons. Moreover, it considers the inconsistency degree within the pair-wise comparisons and displays the inconsistency on the screen.

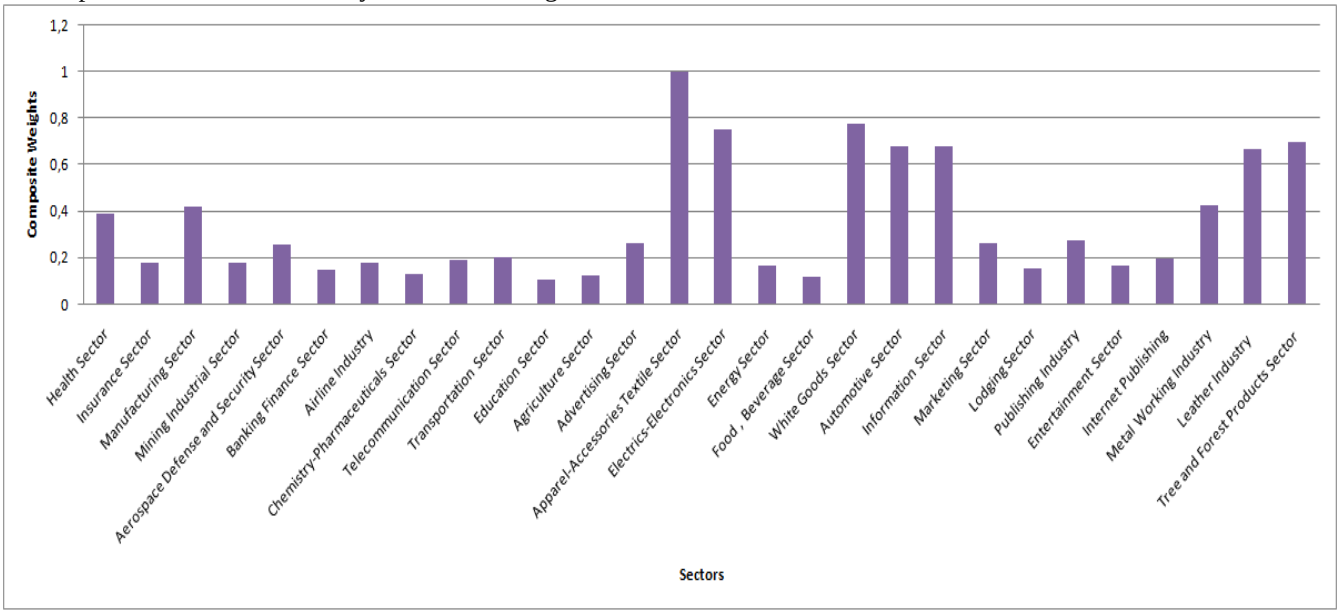



**Figure 5.** Ranking of Alternatives in Sectors Selection

A consistency check is requirement state and it should be implemented while priorities (precedence) produce the state just in the circumstance that obtain from consistent matrices. Relation with the eigenvalue method can be suggested - submitted as consistency index (CI) by Saaty, 1977 and Alias et al., 2009 :

$$CI = \lambda max - n \,/\, (n-1) \qquad \text{Eq.(2)}$$

" where lmax: maximal eigenvalue".

RI: The random Index and also CR must be less than 10 percent. So the matrix can be provided as an acceptable consistency.

$$CI = CI/RI \qquad \text{Eq.(3)}$$

The RIs values are presented in this table by Saaty (Saaty, 1977; Ishizaka and Labib, 2009). Simulations with various number of matrices or imperfect matrices might have run by different researchers. Their RIs are different but nearby Saaty's (Alonso and Lamata, 2006).

**Table 4.** Values of RI from Saaty (1977)

| n | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|
| RI | 0.58 | 0.9 | 1.12 | 1.24 | 1.32 | 1.41 | 1.45 | 1.49 |

Decision makers may recognize the inconsistency degree and if it is greater than 0.1, they should recompare the decision elements. As another choice, decision makers may ignore inconsistency degree and continue to compare decision elements. It is up to them, but for accurate decisions, they should change their comparisons when the inconsistency degree exceeds 0,1 (Saaty, 1977; Alonso and Lamata, 2006; Alias et al., 2009).

Furthermore, ExC allows decision makers to make sensitivity analysis of the selected alternative. Software enables decision makers to see which alternative becomes the best when they change the relative importance of decision criteria. In the previous section, selection of the best consultant problem was solved manually. Now, the same decision problem is solved with ExC and the screenshot is given in Figure 6.

As seen on the left side of Figure 6, the goal is "Selection Sector For Lifecycle (LC) Expectancy of Product/Service" and according to this goal, composite weight of each sector is displayed and on the right side of Figure 6. It is seen that Apparel-Accessories Textile Sector is the best alternative with a weight of 1,000 in Ideal Mode. When the calculations are performed manually, the composite weight for Apparel-Accessories Textile Sector is 0,994 in Normal Mode. The small difference is due to the calculation style of ExC and does not change the ranking of alternatives in the selection process.

According to the weights of all decision Criteria, it is seen that Durable Goods and Product Life Span through better Quality with 6,7 % becomes the most appropriate Priority decision Criteria to make decision about "Life Cycle Expectancy of Products/Service" in Figure 7.

The sensitivity analysis indicates that among the listed firms the greatest priority for The Aspects-Criteria of Life Cycle Span (LCA - Life Cycle Assessment) belongs Product Life spans Through Better Quality with 6,7% and Durable Goods; it is followed by Long Time Guarantee with 6,4 % then Extend The Product Lifespan with 5,9%; Product Reliability-Quality with 5,8%; Product Lifetime Guarantee with 5,7 %, Technological Obsolescence with 5,1%; Slow Fashion with 4,4%; Consumer Under Pressure to Purchase Again (Perceived Obsolescence) with 4,2%; Functionality of Products/services, Fashion Trends and Customer Satisfaction with 3,9 %; Customization with 3,7%; Product Satisfaction and Modular Structure with 3,5%; Product/Service Agency Representation, The Social and Environmental Degradation with 3,4%; Social Sustainability Problem with 3,2%; Innovation over

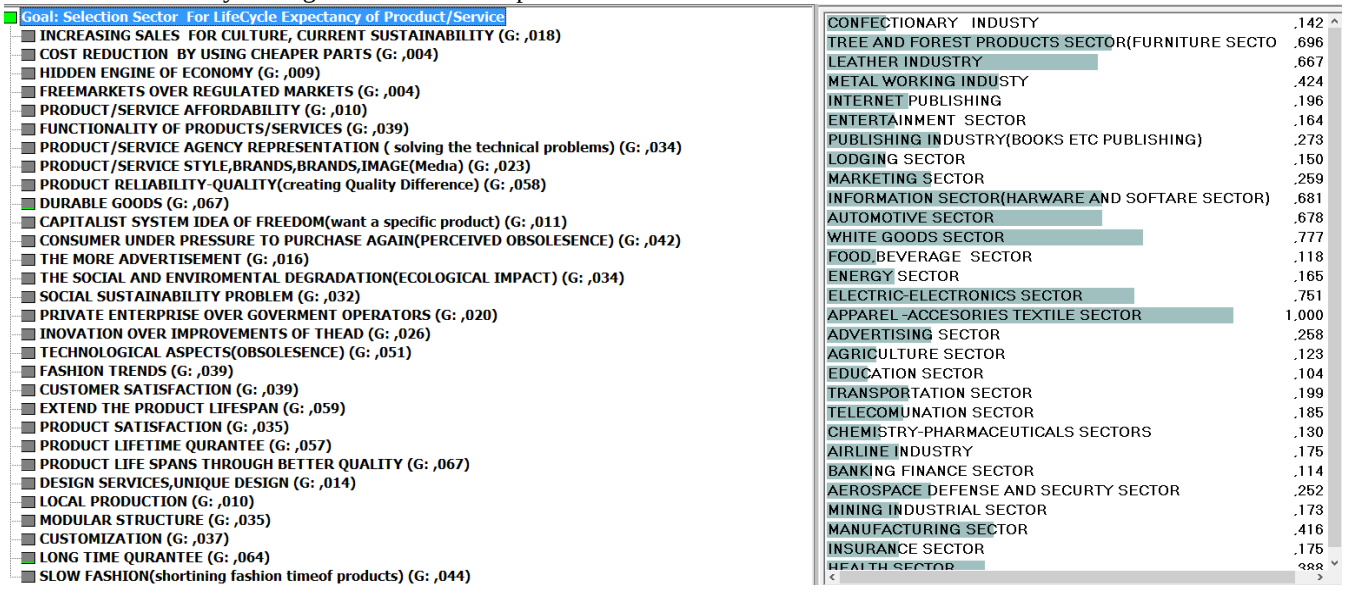



**Figure 6.** Screenshot (Ideal Mode) of ExC Software Program

Improvements of Thread with %2,6; Product/Service Style-Brands with 2,3 %; Private Enterprise over Goverment Operators with 2%; Increasing Sales for Culture, Current Sustainability with 1,8% ; The More Advertisement with 1,6%; Design Services-Unique Design with 1,4%; Capitalist System Idea of Freedom with 1,1%; Product/Service Affordability and Local Production with 1%; and Hidden Engine of Economy with 0,9% , finally Free markets over Regulated Markets with 0,04%.

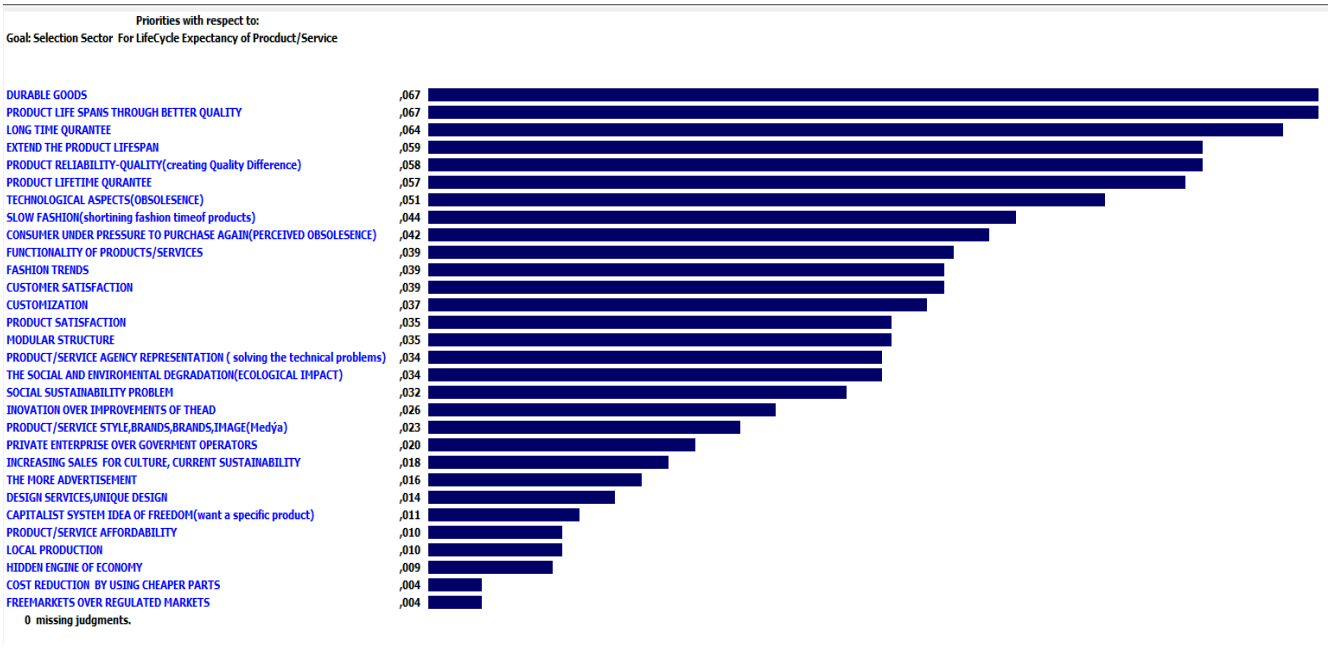



**Figure 7.** Priority Analysis between the Main Criteria in ExC

Moreover, asmentioned before in this section, decision makers can make sensitivity analysis of the results regarding to changing the weights of decision factors. The sensitivity analysis in Expert Choice is given in Figure 8.

The weights of decision criteria and the composite weights of the decision alternatives are given in percentage by Figure 8. After altering the weights of decision criteria below, as result decreasing the weight of "Durable Goods" , "Product Life Spans through better Quality". About Making decision between Decision Alternatives as sectors, it is seen that Apparel-Accessories Textile Sector becomes the most appropriate sector in Figure 8.

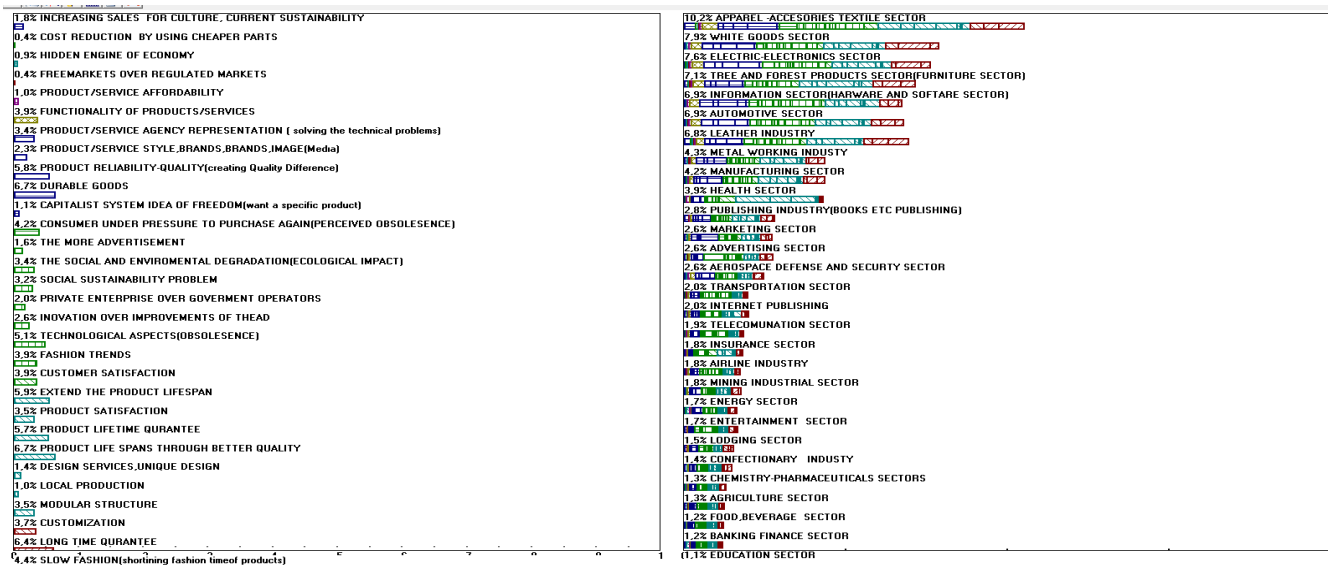



**Figure 8.** Perception of Sensitivity Analysis in Expert Choice

ANP could provide to model complicated decision issues, which a hierarchical structure such as defined via AHP is not enough and tolerable (Gencer and Gürpınar, 2007, Figure 9).

a-This process can be used as a decision finding technique.

b-ANP could represent a hierarchal framework to solve complicated decision issues.

c-ANP is a common model of the Analytic Hierarchy Process AHP.

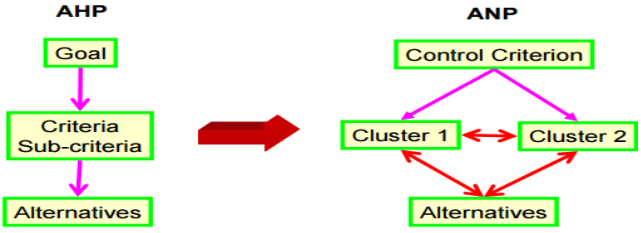



**Figure 9.** (a) Structure of AHP, (b) Structure of ANP (Gencer and Gürpınar,2007, modified by Author)

d- ANP model supports to take feedback interconnections, links and closed loops.

## 5. ANP Model of Decision Making Problem

The hierarchical structure of the decision problem of selection of the most convenient sector for LCA of Products/Services is given in Figure 10.

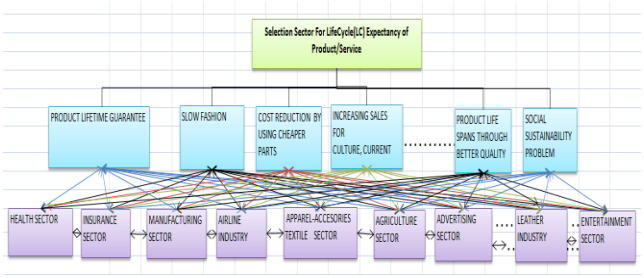



**Figure 10.** Hierarchy of Selection of the most convenient Sector via ANP

In the modeling of this issue in Figure 10, cooperations with sub-criteria are observed. For example, according to the high number of "Product Reliability-Quality (PRQ)", "Product Satisfaction (PS)" of a sector (service or manufacturing sector) may increase. In other words, Production Satisfaction criteria is affected from Product Reliability-Quality sub-criterion. Moreover, due to fine "Production Satisfaction" the sector may be given "Product Reliability-Quality". In this case, Product Reliability-Quality criteria is affected from Production Satisfaction criteria. As seen, Interactive relation with two-sub factors and also this issue might be observed in the estimations and assessment. Other impacts within sub-criteria are considered in the same step of application and these influences are examined via decision maker and experts.

### *5.1.ANP Application of A Multi Criteria Decision Making Software Program-Super Decision*

Super Decisions is a software program developed to solve Multi Criteria Decision Making (MCDM) problems when there are interactions within the same level or among different levels in the decision hierarchy. It also solves the problems which are in hierarchical structures, but since

" ExC " software is specialized to solve hierarchical structures, there is no need for the use of Super Decisions (SuD) in hierarchical models. Calculations in the software are based on the calculations in AHP which were mentioned in the AHP part. Pair-wise comparisons again performed in Super Decisions and relative weights of decision elements are found. In addition to AHP calculations, the effects of interactions within decision elements are listed in weighted super matrix and limit matrix forms in SuD.

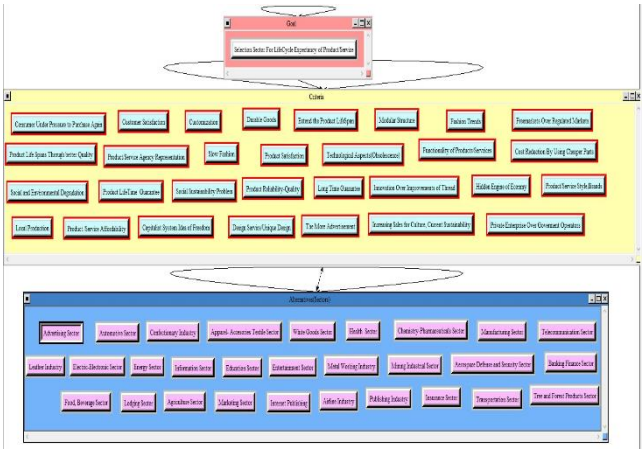


**Figure 11.** Model for Selection Sector for Lifecycle (LC) Expectancy of Product/Service Problem in Super Decisions

In SuD software in order to solve the MCDM problems, construction of a model and displaying all the interactions in this model properly are needed. There are various forms of these models based on interactions within decision elements. For the Selection Sector For Lifecycle (LC) Expectancy of Product/Service according to the LCA Criteria, the only interactions are within decision sub-criteria and there are no other interactions among any of the hierarchical levels. For instance, as mentioned before, the sectors which are decision alternatives, do not affect each other. Within the guidance of this information the model presented in SuD software is given in Figure 11.

### *5.2. Evaluations of Analytic Network Process*

All of the methods selected Apparel- Accessories Textile Sector such as the most appropriate alternative, however nor yet AHP examined the cooperations according to the decision components during the choosing process. In the Selection Sector For Lifecycle (LC) Expectancy of Product/Service-Planned Obsolescence issue, there are different interconnections associated with decision items and Analytic Network Process (ANP), which allows for

possibility these interconnections, most actually weights of the sub-criteria and provides the most suitable combined weights in the ranking of alternatives.

Additionally, by means of the software program called SuD, which performs ANP calculations and selects the best alternative in seconds, implementation of ANP saves time to the decision maker.

**Table 5. Rankings of Sectors**

| Results of Sector Selection | | | |
|---|---|---|---|
| *Sectors* | *AHP* | *ANP* | *RANK* |
| Apparel- Accesories Textile Sector | 0,092 | 0,1 | 1 |
| Electric-Electronic Sector | 0,083 | 0,086 | 2 |
| White Goods Sector | 0,082 | 0,085 | 3 |
| Information Sector | 0,076 | 0,079 | 4 |
| Tree and Forest Products Sector | 0,075 | 0,076 | 5 |
| Automotive Sector | 0,073 | 0,076 | 6 |
| Leather Industry | 0,067 | 0,075 | 7 |
| Metal Working Industry | 0,042 | 0,044 | 8 |
| Manufacturing Sector | 0,038 | 0,059 | 9 |
| Aerospace Defense and Security Sector | 0,03 | 0,034 | 10 |
| Publishing Industry | 0,029 | 0,03 | 11 |
| Health Sector | 0,027 | 0,029 | 12 |
| Advertising Sector | 0,024 | 0,027 | 13 |
| Mining Industrial Sector | 0,021 | 0,025 | 14 |
| Transportation Sector | 0,021 | 0,026 | 15 |
| Internet Publishing | 0,02 | 0,024 | 16 |
| Airline Industry | 0,02 | 0,024 | 17 |
| Telecommunication Sector | 0,02 | 0,023 | 18 |
| Marketing Sector | 0,019 | 0,023 | 19 |
| Energy Sector | 0,018 | 0,023 | 20 |
| Entertainment Sector | 0,017 | 0,02 | 21 |
| Insurance Sector | 0,016 | 0,019 | 22 |
| Lodging Sector | 0,016 | 0,019 | 23 |
| Confectionary Industry | 0,016 | 0,019 | 24 |
| Agriculture Sector | 0,014 | 0,018 | 25 |
| Chemistry-Pharmaceuticals Sector | 0,014 | 0,018 | 26 |
| Banking Finance Sector | 0,013 | 0,015 | 27 |
| Food, Beverage Sector | 0,013 | 0,015 | 28 |
| Education Sector | 0,012 | 0,015 | 29 |

In conclusion, ANP is superior to their method, AHP, and it is suggested to Textile-Apparel Sectors to apply ANP with its software SuD to make better decisions.

## 6. Results of the Methodology

According to this issue, this application supports to research the appropriate resource(sector) assignment problem in Industrial Sectors in Turkey After interviews with experts of these sectors, this perception seems that the base issue in the appointment of choice sectors arises the incompetence to select the most appropriate sector and criteria when there are different alternatives. To determine the issue, Multi Criteria Decision Making (MCDM) techniques were examined. To apply MCDM methods and to authorize the sector management to notice about facilities, probabilities of the sectors, sectors properties, features issues were mentioned and advised the industry to use research scope of sector facilities.

Two various techniques of MCDM methods were implemented in detail. While the implementation of ANP and AHP techniques for this case, decision making methodology was operated. With two methods, a real life issue i.e. Selection Sector for Lifecycle (LC) Expectancy of Product/Service Problem- Planned Obsolescence was formed and sectors were ranked based on reports of sectors, views, subjective evaluations of the experts, directors in this scope with respect to selected method. Rankings in two methods are given in Table 5.

Furthermore, two beneficial software programs, namely Expert Choice and Super Decisions, which perform calculations automatically and save invaluable time were examined in detail.

After two methods were studied, they were evaluated and seen some serious shortcomings. One of them does not have a software program to perform long lasting calculations and other two do not give the decision maker to provide pair-wise comparisons in broad area. These two methods are not entirely consist with the framework of the selection Sector for Planned Obsolescence and so on. A short summary of these methods is given in Table 6.

**Table 6. A Short Summary of AHP and ANP**

| | AHP | ANP |
|---|---|---|
| Structure | Hierarchical Independence-Based | Not Hierarchical Dependence-Based |
| Decision Allowance | In Close Environment | In Close Environment |
| Software Availability | YES | YES |

After evaluating two methods, ANP is selected as the best method due to its totally compatible framework according to the framework of the choice problem and the persistence of a benefit software program to execute its mathematical calculations. Also the use of ANP and its software Super Decisions are suggested to industrial sectors.

## 7. Conclusion and Comments

Planned obsolescence (PO) theory mostly with principle of encouraging the consumer to substitute the purchase sooner than required, prompting the incentive to buy new goods that could offer better benefits is no longer defensible currently, whereas some researchers support the creative destruction so that businesses can develop more, increase employment, income, promote competition within the industry, boost the marketplace. PO is simply a marketing strategy – one firmly backed by industrial-physical obsolescence strategies. Orbach (2004) argues that physical obsolescence in a monopoly is a legitimate cost-saving tactic, since customers have no option of commodity in such a structure and it is not a danger to lose them. And, besides being such a marketing tool, physical obsolescence alone does not function as a production tactic for the dynamic apparel industrial sector – essentially because a customer who is sensible to that would turn to another company. Marketing mix manipulation enables smart, technological obsolescence methodologies including such fashion design. Another that can demonstrate technical as well as physical obsolescence. Consequently, both marketing and technological obsolescence are supported by physical obsolescence and make it a possible strategy within the fashion sector. From that then we can draw the conclusion that it is impossible to understand marketing from PO or PO from the existing fashion world, but maybe that is the really quite distinction necessary to

transform the fashion world into a different way – to create a fundamental change.

From this evaluation, it can be concluded that Planned Obsolescence has been standard practice in manufacturing and manufacturing since the beginning of the present century. Throughout the manufacture of high-level goods, architects and developers played a vital position, but in certain situations they were reduced to commercial advantage in a competition that was primarily targeted at consumerism. Thanks to the advent of emerging digital technology and applications such as the Internet of Things (IoT), Industry 4.0, autonomous machines, artificial intelligence and much other, this cycle has significantly accelerated since the past twenty five years.

PO which generates short lifespan of the existing product obviously affects durability. Growth of population, increased pollution produced, water scarcity, lack of environmental assets and global warming, among several other factors, are pressing for a new development approach since this planned obsolescence approach is threatening productivity. Planned obsolescence is forcing customers to invest additional money on useful goods than anticipated, purchasing more often than required. This creates social disparities between people which can enable the purchasing of new/unique designs and segment of the population which must be consistent and choose to use defective or obsolete inventory.

The goal of the marketing strategy is to secure the optimal combination of factors. This approach will naturally lead to a detailed classification of inventions as each category is further broken down in respect to additional dimensions such as longevity, user functionality, etc. It is not the objective to develop such a system here, but to point to the usefulness of certain framework market strategy directing. The marketing strategy based on the planned obsolence has accomplished nothing more than to indicate the general direction in which marketing management should proceed in order to be more methodical in meeting some of the technology's uncertainties. The market segmentation strategy indicates that technologies should be assessed with respect to the demand characteristics of specific business sectors. Technology as an alternative to other marketing effort application fields meets with some perceptible reaction on tbe part of buyers, whose relative sensitivity can be compared with the responding to other marketing strategies for the sectors. Which starts as an inquiry into the factors that render planned obsolescence sound like a rational approach achieving tremendous popularity in the apparel industry concludes with the realization that these activities might be unrealistic in the longer term. It is obvious that the public understanding of what might seem like 'industrial secrets' has reached the point in which fashion obsolescence could shortly eventually stop to maintain a decent benefit even from the first utilization planned obsolescence mostly with light-blue cartel of the 20s to the increase of quick fashion in the last twenty years.

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